JULY, 1954

MODERN Machine Shop

Putnam End Mills Produce Finer Finishes

Noted For Fast Free Cutting on toughest metals at heavy feeds and high speeds, Putnam End Mills produce smooth accurate cuts having exceptional finishes that often eliminate all grinding or hand finishing.

Your toughest milling operation is an opportunity to prove the unusual superiority of Putnam End Mill design and manufacture. Select from over 1200 sizes and types of standard Putnam End Mills the one for your job and then watch it more than meet the challenge with faster, smoother cutting.

PUTNAM

2981 CHARLEVOIX AVENUE • DETROIT 7, MICHIGAN

for want of a horse the smith was lost

THE blacksmith shop was a busy place . . . when horsepower came "on the hoof". But when the first gasoline engine coughed and sputtered into life, the days of the village blacksmith were numbered.

That's progress. Spurred on by competition, it spells success for some things, obsolescence for others.

In today's highly competitive market the search for *new* and *better* methods of production is an urgent one. It's a problem that calls for fresh thinking and sound experience.

When it comes to precision finishing, we would like to show you how Heald engineering and the latest Heald equipment can help you build a better product at lower cost. New developments in automation, way-type and transfer Bore-Matics, interchangeable tooling and internal grinding methods may well be the answer to your particular problems.

Competition is wonderful when you're *ahead* of it. Our business is to keep you there. That's why IT PAYS TO COME TO HEALD.

Internal and Rotary Surface Grinding Machines

Bore-Matics

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton
Detroit • Indianapolis • New York

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MODERN Machine Shop

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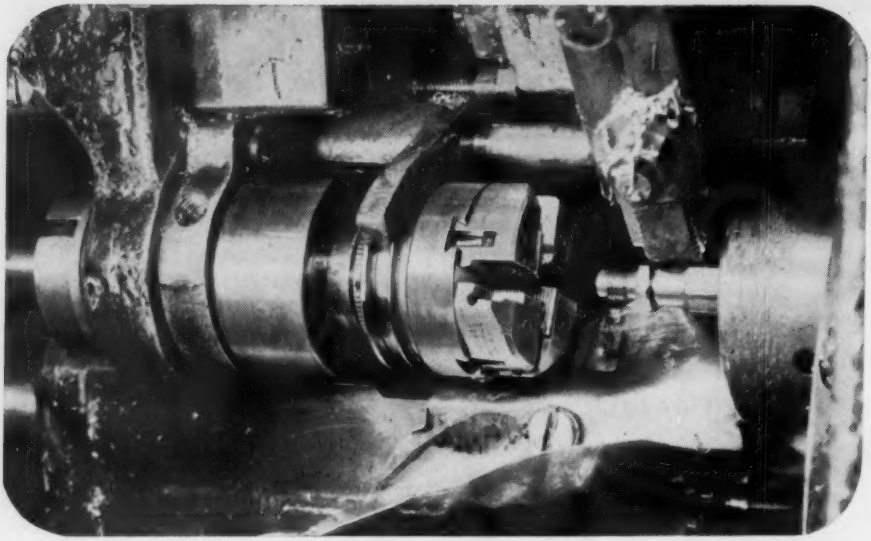


Economy Threading on Limited Clearance Automatics

To assure economy threading on automatic screw machines where limited die head clearance is a major factor Frank H. Wilson Co., Inc., in Detroit, Michigan, use the ½" LL LANDEX Head. Applied to one of their small Acme-Gridley's for threading tubing nuts this head cuts ½", 20 pitch UN threads ⅜" in length on B1113 screw stock to a class three fit. An average of 20,000 pieces are threaded between chaser grinds.

Compactly designed with only a 2⅞₁₆" swing the ½" LANDEX will thread all diameters from #4 to ½". A minimum number of working parts made of hardened and ground alloy steel contribute to the high degree of rigidity and accuracy of this LANDEX Head. Compare the chaser lengths in the illustrations and note the long chaser life this LANDIS user has received. These chasers will still produce thousands of threads as (1) LANDIS Tangential Chasers are usable for 80% of their original length; (2) only a few thousandths of metal need be removed from a chaser when regrinding; (3) when regrinding the same amount of metal need not be removed from each chaser; (4) long chaser life is received between grinds. These are the basis for economy in any threading operation.

Write for Bulletins F-80 and F-90.

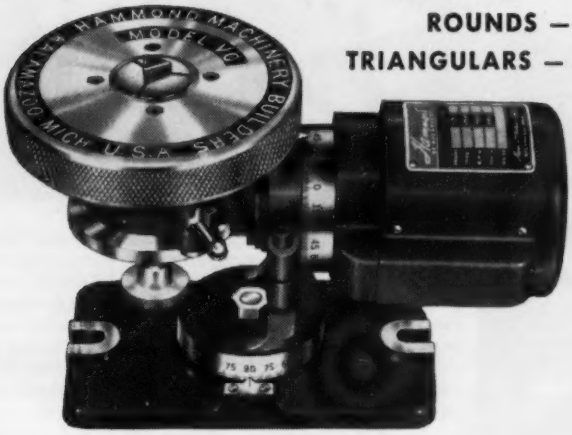
LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A. MC-397

Hammond OF KALAMAZOO
GOOD MACHINERY SINCE '82

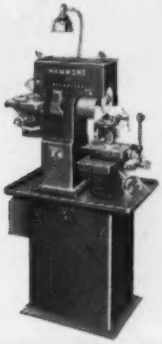
INSERT
GRINDING FIXTURE
For Solid Carbide Tools

ROUNDS — SQUARES
TRIANGULARS — RECTANGULARS



MODEL VC, Style M Motorized Solid Carbide Insert Grinding Fixture. Style H, without motor also available. Write for Bulletin No. 235.

THE Hammond Solid Carbide Insert Grinding Fixture pays for itself in a few weeks. Offers a fast, economical and accurate means of grinding chip breaker grooves in round, square, triangular and rectangular shapes and for rough and finish grinding of dull and damaged carbide inserts. Motorized Style M with lug base can be mounted on most tool and surface grinders and Hammond CB-76, CB-77 and CB-77W Chip Breaker Grinders.



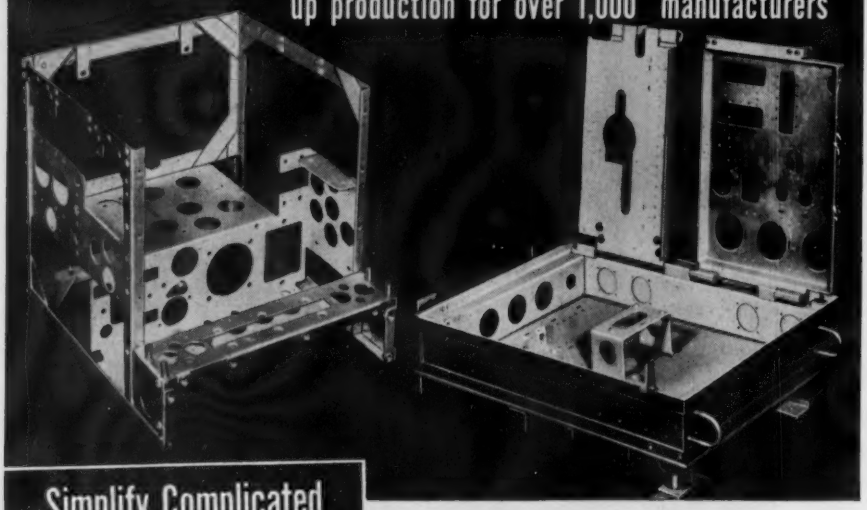
HAMMOND MODEL CB-77 CHIP BREAKER AND DIAMOND FINISHING GRINDER can be supplied with both the standard Any Angle Vise and the Model VC Solid Carbide Insert Grinding Fixture.

BUILDERS OF AMERICA'S MOST COMPLETE
LINE OF CARBIDE TOOL GRINDERS

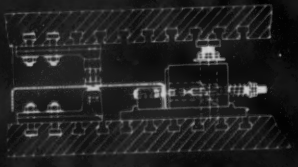
Hammond Machinery Builders INC

1615 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

Whistler Adjustable and Magnetic Perforating Dies are stepping up production for over 1,000 manufacturers



Simplify Complicated Piercing Operations



Use this HU-50 90° Perforating Unit on the same job with other Whistler Dies . . . often saves extra press operations.

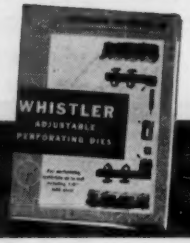
USE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals . . . fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press . . . without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

Re-use the same dies in different arrangements on many jobs. Punches and dies are interchangeable.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes and shapes of punches and dies available up to 3 inches. Special sizes and shapes to order.

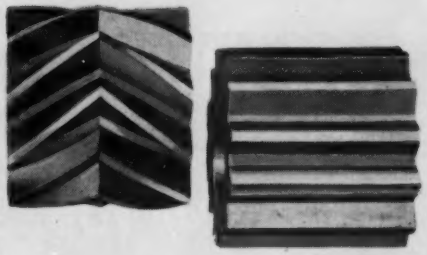
S. B. WHISTLER & SONS, Inc.

740 Military Road
Buffalo 23, New York



For prices and application data on this modern way to speed production and cut unit costs, write for these illustrated Whistler catalogs.

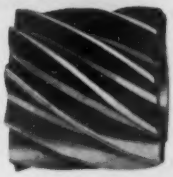
You can make all these gears on one machine

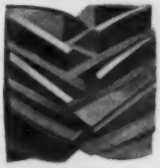


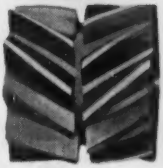
These are only some of the wide variety of precision gears and parts that you can make on a Farrel-Sykes "Twin-Head" generator.

Costs will drop as the unequalled speed, accuracy and convenience of this machine keeps production flowing fast. Setups and change-overs are effected so rapidly that down-time is held to a minimum. Operators prefer the machine for its ease of operation, such as rapid selection of speeds and feeds, simple adjustment of cutters, and positive control of infeed.

Write now for details of this versatile gear generator. You will find it profitable in your shop.

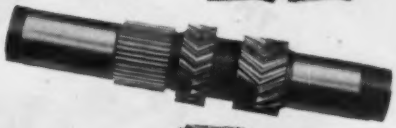


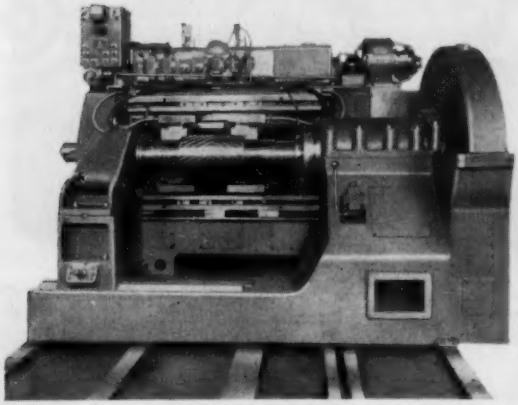


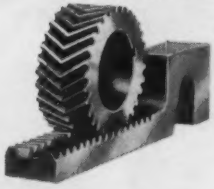


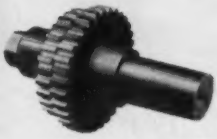
FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Cambridge (Mass.), Akron, Cleveland, Chicago, Los Angeles, Houston









FB-939

END MILL SPECIALISTS

and What it...
...Means to YOU...

HIGH SPEED

TWO FLUTE

THREE FLUTE

FOUR FLUTE

LONG LIFE

The major portion of production at Melin Tool Company is devoted to End Mills. When you specify MELIN...you know your order is receiving personal attention. There are *no* priorities in *other* divisions.

Write for the new Melin Tool Catalog and Price Sheet.

MELIN TOOL CO. INC.

Representatives in Principal Cities

MELIN TOOL COMPANY, INC.

West 140th St., Cleveland 11, Ohio

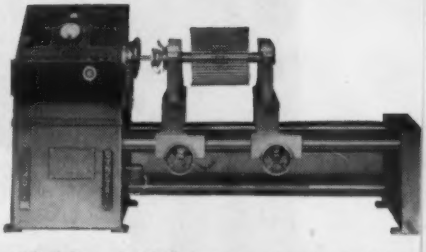
the final *check* for every rotating part . . .

Maybe it's a crankshaft or an armature . . . perhaps a fan or a belt pulley. No matter. The important thing is this: If it isn't *balanced*, it isn't ready for service.

Smooth operation and long life require that accurate static and dynamic balance be rated right along with mechanical specifications to assure the efficiency of the finished product.

Gisholt Balancing Machines can locate and measure unbalance vibrations down to .000025" with simple readings . . . handle any assembly from ½ ounce to 50 tons.

The cost? Very moderate. Let Gisholt Balancing Machines provide the final check. Write us.



The Gisholt Type 3U Balancer **shown here is capable of balancing rotating parts or assemblies weighing from 50 to 1000 pounds. Other sizes and types are available to answer any balancing problem. Gisholt Balancers can also be furnished with correction equipment to meet your own specific requirements.**

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

DYNETRIC BALANCERS GISHOLT

DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

PLUS or MINUS

CINCINNATI Micro-Centric Grinding Machines are made in two sizes, Nos. 1 and 2. Catalog No. G-573 contains complete information.

CINCINNATI

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

Lightwave

FILMATIC

Examples of the work ground on CINCINNATI Micro-Centric Grinding Machines. Many parts of similar shape can be ground on the Micro-Centric.

Precision of a lightwave has been taken out of the laboratory and put to work in the production line. CINCINNATI FILMATIC Micro-Centric Grinding Machines turn the trick by grinding anti-friction bearing parts and similar components to accuracies of squareness and roundness within 25 millionths of an inch! The work is neither clamped nor chucked. A new principle, employing a drive plate to rotate the work through skiving action, does two things: (1) rounds up the work to an accuracy never before approached by grinding, and (2) grinds the diameter exactly square with one face. The grinding cycle is automatic, and the machines can be equipped for fully automatic operation, including loading, unloading, wheel dressing, and periodic compensation for size. ¶For brief details look in Sweet's Machine Tool Catalog. Or complete information may be obtained by writing for publication No. G-573.

CINCINNATI GRINDERS INCORPORATED

(Subsidiary of The Cincinnati Milling Machine Co.)

CINCINNATI 9, OHIO

How To Make One Machine Equal Two!

KNIGHT'S NO. 50

PRECISION BORING & VERTICAL MILLING MACHINE

SPECIFICATIONS

- Table travel—Longitudinal 28", cross 18"
- Vertical capacity—28"
- Table feeds—Dial type, 16
- Table feeds—per minute, 5/16" to 20"
- Table rapid traverse—both directions, 100"
- Spindle speeds, 16—40 to 2000 R.P.M.
- Boring feeds—Infinitely variable, .0000"-.010"
- Horsepower, 7½
- Weight, 8100 Lbs.

By doing both milling and boring operation that ordinarily require 2 or more single-purpose machines, *work transfers are eliminated,* and *setup time is cut to half or less. Exceptional working capacity* is provided by unusual cross table travel and vertical capacity. Check the specifications at left.

Power to handle any job—rugged strength and rigidity—easy and convenient operation—these are only a few of the many other advantages incorporated in the Knight No. 50. Get *all* the details about this remarkable time-saver and profit-maker.

Mail the coupon today.

KNIGHT VERSATILE MACHINES

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3922 W. PINE BLVD. • ST. LOUIS 8, MO.

Please send catalog on No. 50 and other Knight Milling machines.

Name.....

Title.....

☐ Send information on Knight 20" and 42" Rotary Tables.

W. B. KNIGHT MACHINERY CO.
3922 W. PINE BLVD. • ST. LOUIS 8, MO.

ATRAX IN ACTION

$3,000 SAVINGS IN LABOR WITH $100 WORTH OF CARBIDE BURS

A CASE HISTORY: One of our customers had an extremely difficult problem of burring some piece parts after assembly. After consultation with Atrax engineers, it was determined that Solid Carbide Burs were the only type that could be used to salvage this huge job. Six Carbide Burs were bought for this job, totalling approximately $100.00. They saved the company over $3,000.00 in labor. Besides this, they made possible salvage of very valuable piece parts for a very nominal original investment.

Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

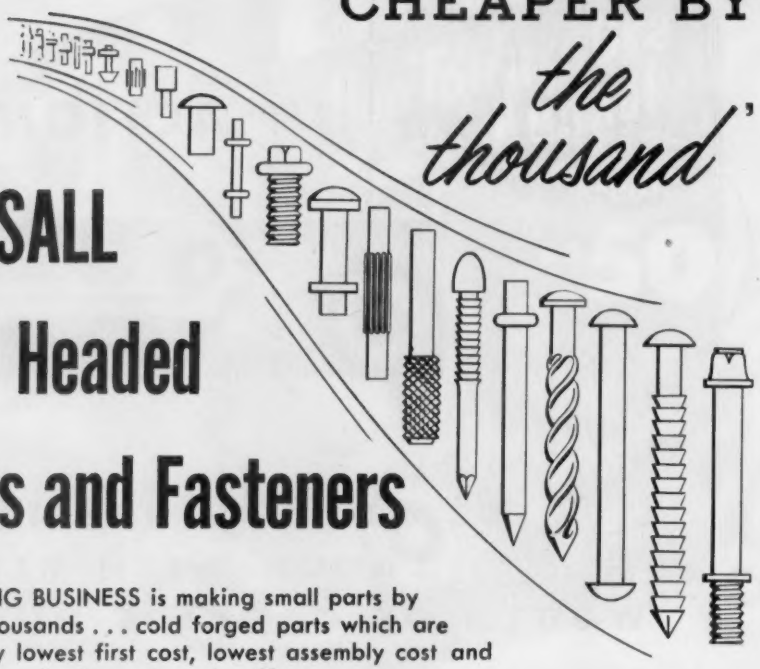
NEW! Complete 88-page Manual and Catalog of Carbide Tools. Write for your free copy.

THE ATRAX COMPANY NEWINGTON 11, CONNECTICUT

HASSALL SERVICE

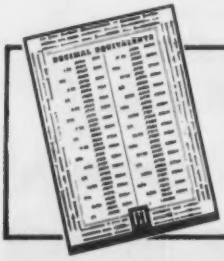
'CHEAPER BY *the thousand*'

HASSALL Cold Headed Parts and Fasteners

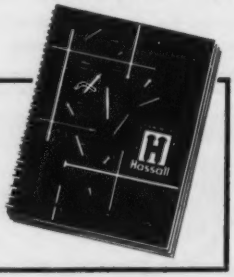


Our BIG BUSINESS is making small parts by the thousands . . . cold forged parts which are usually lowest first cost, lowest assembly cost and strongest for longest service life.

A quotation from us won't cost you a cent but it's very likely to show you a much LOWER COST source of supply for any small metal part or fastener you are using in your product. We cold head any metal.



NEED a good 3 color decimal equivalent chart? Yours without obligation . . . just drop us a card. Complete catalog on request.



SPECIAL NAILS RIVETS SCREWS
Hassall
ESTABLISHED 1850

JOHN HASSALL, INC.

P. O. Box 2177 **Westbury, L. I., New York**

UNION

Craftsmanship...

Expertly fashioned by hand, this engraved, finely-balanced, ceremonial sword is our outstanding example of the armorer's art.

Today, outstanding in their field, Union cutting tools meet every demand of your most highly skilled workmen.

Dress sword carried by General H. K. Oliver of the Ancient and Honorable Artillery Company of Boston in 1845.

END MILLS

Spiral Cut
Two Lipped
Straight Shank
Taper Shank
Shell
Hollow
T Slot
Double End
Single End
Long
Small Diameter
Corner Rounding
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Shell
Rose Chucking
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CUTTERS
HOBS
METAL SLITTING SAWS
INSERTED BLADE CUTTERS
COUNTERSINKS
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CARBIDE TOOLS

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

End Mills Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

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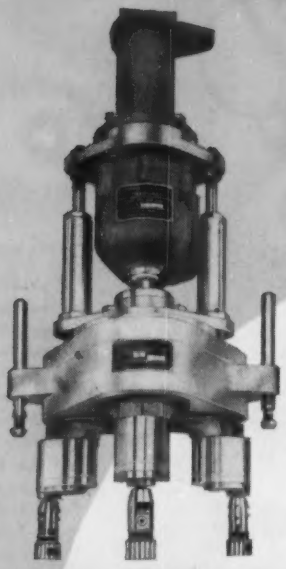
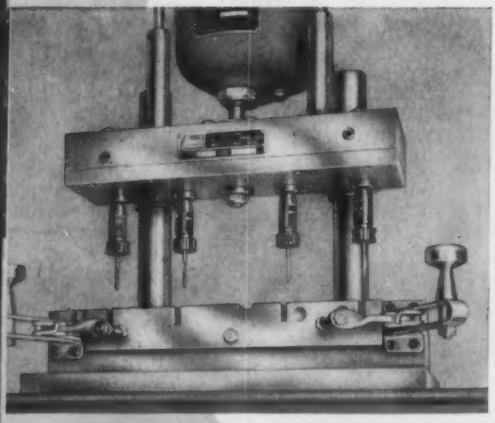
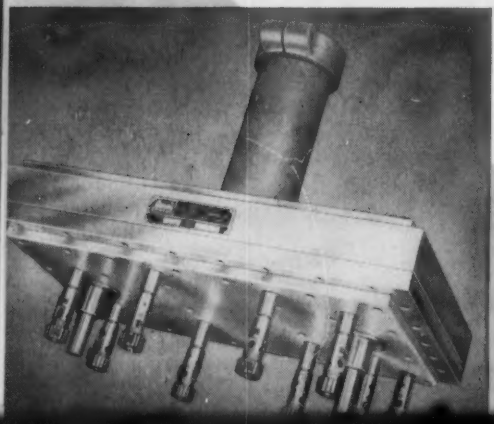


Jarvis MULTI-TAPPERS

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS





For Multiple Tapping and Drilling

Engineered and built to your specific production requirements from our basic standard components, Jarvis Multi-Tappers can be furnished for any type of drill press available.

We invite your inquiries—let us assist in analyzing your tapping and drilling needs!

Send for our catalog featuring Jarvis Multi-tappers

WHEN POWERED WITH A JARVIS TORQOMATIC DRIVE THE JARVIS MULTI-TAPPER PROVIDES THE MOST EFFICIENT AND PRODUCTIVE MACHINE IN THE FIELD.

THE CHARLES L. JARVIS COMPANY

MIDDLETOWN IN CONNECTICUT

Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

have "Custom Made" Cutting Edges at NO EXTRA CHARGE

"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.

Send for complete New 56 page Tap Catalog and Manual.

Jarvis Manufacturers of . . . TAPS

TORQOMATICS

MULTI-TAPPING AND DRILLING

CARBIDE TOOLS

FLEXIBLE SHAFT MACHINES

ROTARY FILES & MOUNTED POINTS

THE CHARLES L. JARVIS COMPANY MIDDLETOWN, CONNECTICUT

SCULLY JONES

"Precision

give you benefits

Quick-Change Chucks speed sequence operations on radial drill at "Caterpillar"

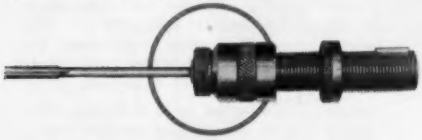
This radial drill at Caterpillar Tractor Co. does sequence operations with multiple-spindle efficiency because Scully-Jones Quick-Change Chucks make tool changes easy and fast! Just lift the locking ring without stopping the machine for quick, safe tool changes. Use them to speed production and reduce operator fatigue on single-spindle sequence drilling, reaming, tapping, and other jobs. *Write for Bulletin 3-50.*

Holding" Tools

which reduce costs on every job!

Newest Floating Holder simplifies tool changes, assures free float

Here's how Greenlee Bros. & Co. uses the Scully-Jones new "JT" Lock and Eject Collet Type Floating Holder on multiple-spindle transfer units. With the double-gear spline-drive principle, these floating holders compensate for any misalignment between tools and work . . . easily maintain close tolerances . . . reduce downtime and damage to cutting tools . . . speed and simplify tool changes . . . reduce maintenance troubles and costs. With true freedom of float, they eliminate "dead spots" and cramping—conditions that may be affecting tool life and quality of work on *your* drilling, reaming, and tapping jobs! *Write for Bulletin 8-50.*

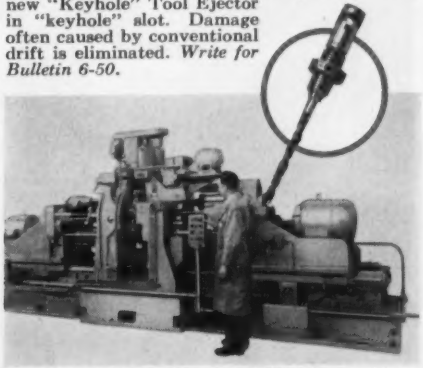


Drill and Tap Chucks cut production costs on Greenlee transfer unit

Greenlee engineers put Scully-Jones Drill and Tap Chucks on this 16-station transfer unit to provide a positive, accurate drive for the cutting tools. Carefully hardened and ground, they resist nicking, give long life under heavy stresses or loads, and run concentric. They help you save on setup time, downtime, and tool replacement . . . cut costs of drilling and tapping operations. *Write for Bulletin 1-50.*

Adjustable Adapters speed tool changes and adjustments

Scully-Jones Quick-Lock Adjustable Adapters help this BARNESDRIL 10-station double-end trunnion machine operate at near capacity. The "pilot nose" makes it easy to insert the adapters . . . minimizing setup and downtime for tool changes. Quick-Lock Nut provides quick, accurate adjustments for tool depth at each spindle or in a tool presetting program. Cutting tools are quickly removed by using Scully-Jones new "Keyhole" Tool Ejector in "keyhole" slot. Damage often caused by conventional drift is eliminated. *Write for Bulletin 6-50.*



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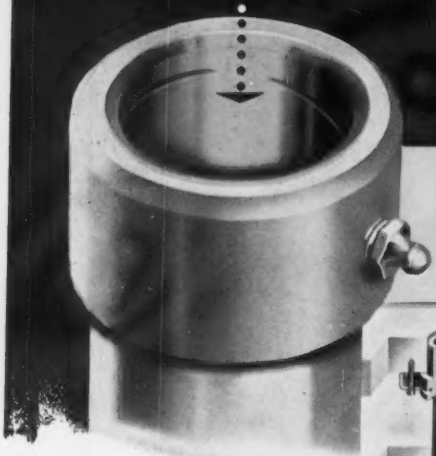
SCULLY-JONES

"Precision Holding" for holding precision

Call your Scully-Jones representative or distributor—factory-trained "Precision Tool and Work Holding Specialist"—for complete information and service.

the **BIG** difference is an **INSIDE** story...



Lamina

GUIDE PIN BUSHINGS

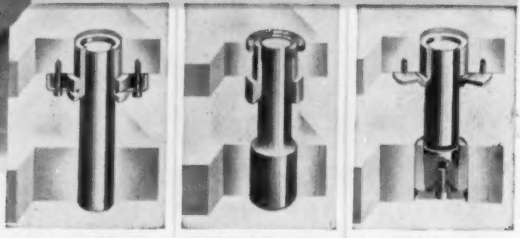
The BIG difference in Lamina Guide Bushings—lower maintenance costs, longer die life, fewer part rejects and press shut-downs—is the free-running bronze plating on long-wearing hardened steel.

Used with Lamina Guide Pins, these bushings provide a precision combination that assures better die alignment—less die wear. And because Lamina Bushings are hardened steel under the bronze bearing surface—pins are water-hardening tool steel—they keep that precision for thousands of extra press strokes without wear or distortion. Yet the smooth, free-running bronze bearing surface eliminates possibility of seizure.

For lower production costs and more consistent quality on all your stamped parts, specify Lamina Guide Bushings and Pins... both for replacement and when ordering new die sets. Our new illustrated bulletin and price list tells the whole story. Contact your die set manufacturer or write direct to us for you free copy.

SPECIFY Lamina GUIDE PINS, TOO!

Lamina also produces a complete range of precision guide pins. Made of water-hardening tool steel, Lamina Pins eliminate "mushrooming" during assembly—add years of service. Available in straight, shoulder and removable styles.



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"BOY SIZE" and "MAN SIZE"

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HOLDER FOR DRILLS 1/16" TO 3/8"

HOLDER FOR DRILLS UP TO 2½"

(This side can also be arranged for wet grinding)

Grinds ALL your Drills { small AVERAGE LARGE

You don't send a boy to do a man's job...neither is the reverse economical. But, with two drill holders ONE *Hisey* Drill Grinder conveniently, quickly, and economically handles ALL drill grinding jobs . . . even with inexperienced operators. A sharp, correctly ground drill . . . (1) drills faster (2) drills more holes per grind (3) drills to exact size (4) reduces breakage (5) increases life of drill by removing less metal when sharpening.

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toolmakers prefer this CINCINNATI shaper

17 cubic foot Revco, one of many Food Freezer models built by Revco, Inc., Deerfield, Michigan.

Revco, Inc., producers of Food Freezers, state their toolmakers prefer using this 20″ H. D. Cincinnati Shaper. They like the convenience of all controls located at the operator's position and the amazing speed of the electro-magnetic clutch and brake. They like the assurance provided by the 50 P.S.I. automatic lubrication. They like the very high accuracy obtained in shaping jigs and fixtures, drawing, forming and blanking dies.

Write for the new illustrated catalog N-6 on Cincinnati Shapers.

Photo courtesy Revco, Inc., Deerfield, Michigan

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DRILL-SPOT FACE-COUNTERSINK-REAM-TAP

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individual operations

...on one Part
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...in ten Seconds!

...that's precision production on a
Morris
MOR-SPEED Machine

a better product at less cost with precision PLUS production

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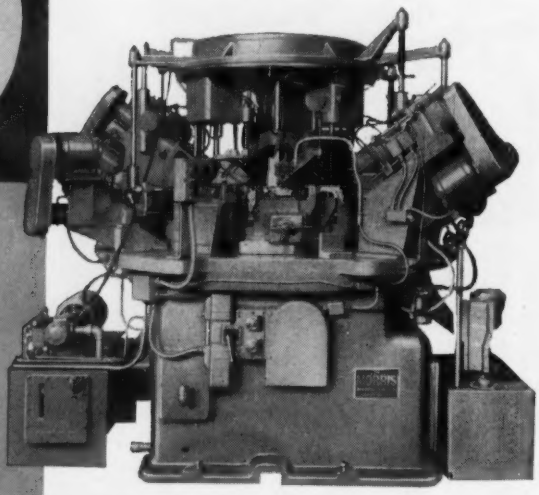
It's easy to say "the way to higher production and lower costs lies in special machinery." The sky-high price and limited application of a "special" often makes this solution impractical.

But Morris Engineers have developed a time-tested method for delivering precision production at lowest cost . . . *without* a staggering investment. Morris MOR-SPEED Machines combine *standard* machine units in a special design that offers all the advantages of "special machinery" without the big price tag.

The machine illustrated is a good example: standard base, standard indexing table, standard center column, standard straight and angular drilling heads, standard coolant and hydraulic units plus a minimum of special tooling. The result is "special" machine production at a very special, low cost.

Your drilling, tapping, reaming and similar operations may be adaptable to a MOR-SPEED solution. It costs you nothing to find out! *Write today for complete details.*



THE MORRIS MACHINE TOOL CO.
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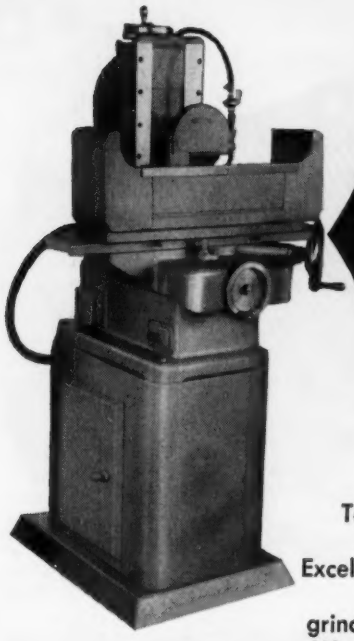


Costs less

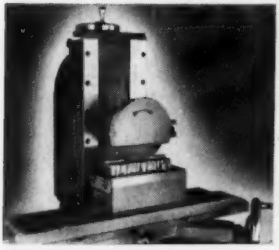
TO OWN, OPERATE, MAINTAIN

Does More Jobs

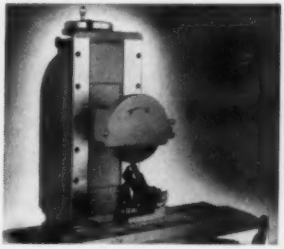
ACCURATELY, LONGER...

EXCEL No. 7 HAND FEED SURFACE GRINDER

To replace your old equipment or to relieve your large grinders of small production jobs use the Excel No. 7. It's ruggedly constructed to do a variety of precision production and tool room jobs — grinding tools, dies, chip breakers, thread chasers — Working surface of table 5⅝" x 10⅜".



Grinding steel blocks in production while held on magnetic chuck. Shoulder is also ground with side of grinding wheel square with flat ground surface. Gives precision at a small investment.



Grinding chamfer on thread chasers. Angles established by use of Covel Style A Vise. Accurate location of chaser relative to grinding wheel lets operator hold consistent dimensions for each chaser.

Set-up for grinding chip breakers in single point tools. Covel Style "A" Vise mounts directly on table and establishes proper angles. Diamond wheel may be used for carbide tools.

Complete Specifications and Features in Bulletin E-74—Write for it today!

COVEL PRECISION GRINDERS

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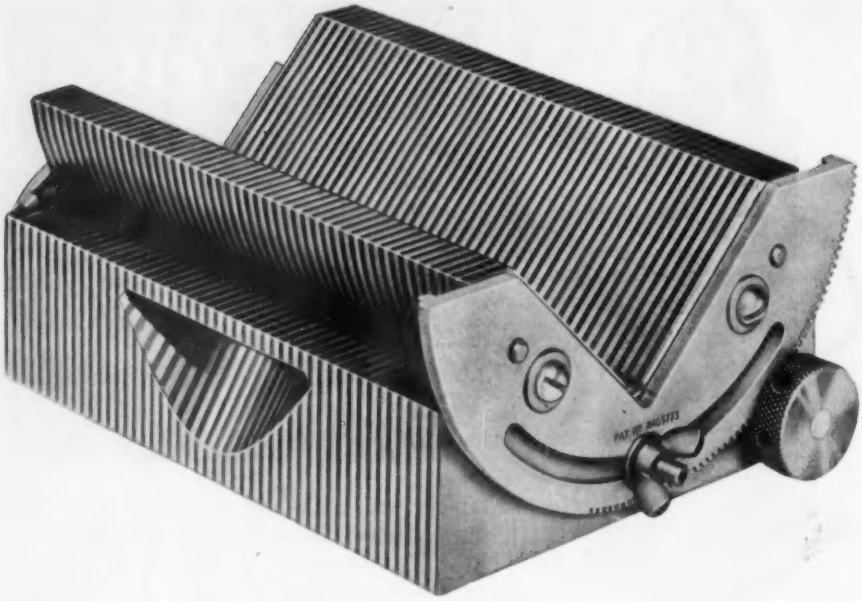

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For the first time, you can equip your shop or laboratory with a *precision* Magnetic Adjustable V-Block. This instrument permits your development of profitable new work of close tolerance nature previously impossible with available equipment. In addition, the Anton Magnetic Adjustable V-Block will reduce time and cost in your present grinding operations.

Write for illustrated catalog sheet listing price, features and specifications and showing how you can reduce costs and improve quality.

Anton Machine Works

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Story of a Reliefer that became the No. 1 Starter

It can happen with machines as well as men. Ask the Powers Regulator Company of Skokie, Illinois—manufacturer of automatic temperature and humidity control systems.

Powers Regulator, like many companies, was faced with the necessity of increasing production of a battery of turret lathes, some of which needed replacement. They also wanted to call in some of their subcontracted work. So they bought a Warner & Swasey 1 AC Single Spindle Automatic to help take the pressure off their hand-operated machines.

This company soon discovered that they had never fully realized the tremendous work potential of the 1 AC. It kept taking over more and more turret lathe work—increasing the production on some of the more complex pieces as much as three times. So the company scheduled the 1 AC for additional shifts—still more work.

The machine really did the job cut out for it! It eased the load on the turret lathes, and the company recovered work previously subcontracted. It performed so well, in fact, that Powers Regulator has since added a second 1 AC.

This story is not unusual. The 1 AC's quick setup and extreme accuracy make it ideal for increasing production on many turret lathe jobs—while requiring less skilled operators. And its advantages as an automatic cuts costs on short and long run jobs. But find out how the 1 AC will boost profits in your plant—call in our nearest Field Engineer for all the facts.

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New "Tru-Grip" Tap Holder

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

CUTS COSTS . . . INCREASES PRODUCTION

on hundreds of tapping operations! If you're operating with horse and buggy methods in your tapping departments — competitively, you don't stand a chance of keeping up with the "producers." Check into the many possibilities and tremendous advantages offered you in modern, streamlined *Procunier Tapping Heads*. You'll be amazed at the built-in "handling ease," the "plus performance," the "cost-cutting" operating features inherent in Procunier Tappers. Super sensitive Procunier Tapping Heads are engineered to supply many extra hours of continuous, accurate tapping without frequent "down-time" interruptions. They produce more pieces per hour—with fewer rejections, fewer spoiled pieces and a minimum of broken taps.

Here are just a few of the many remarkable mechanical improvements that only Procunier Tappers possess: new double cone, cork faced friction clutch assures "finger-tip" sensitivity; soft "cushioned" driving pressure means longer tap life and greater accuracy; ball-bearing equipped for extra rigidity; heat treated gears reduce strain and wear during high speed operations; special balanced gear reversing mechanism eliminates tap wobble; smaller—lighter, more accurate tru-grip tap holder; and many others.

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Giving full particulars on the complete line of Procunier Tapping Machines. Learn how you can adapt them to your specific needs.

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Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

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ELECTRIC FURNACES FOR Air Hardening Steels

Scale-Free Heat Treating Essential to United

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Typical of parts treated is this cam. Hardening variables must be held to the minimum in its production.

Modernize with Sentry and eliminate costly tool spoilage on Air Hardening and High Speed Steels. Simple, economical, reliable.

Request Catalog U-15

Illustrates and describes all sizes of Models Y and YP Furnaces and The Sentry Diamond Block Method.

THE SENTRY COMPANY

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LATHEDOG'S GOT A REAL GOING BUSINESS AT LUNCH TIME SINCE THEY INSTALLED THE NEW MULTIPLE SPINDLE CINCINNATI WITH EASY SPEED CHANG
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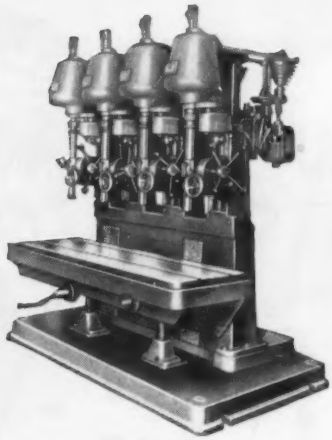
cincinnati

Large-size prints of this J. R. Williams' cartoon are available.



For drilling operations 1½" OD and under, Cincinnati Drills combine dependability with economy. Regardless of your drilling jobs—production, maintenance or general machine work—there is a Cincinnati Drill to fit your needs. And they are the only quality line of drills at these low, low prices.

21" sliding head drills are available in box and round column models. Multiple-spindle arrangements up to six spindles are available. Three distinct methods of feed are incorporated as standard equipment. Three optional ranges of power feed are provided. Eight spindle speeds—76 r.p.m. to 2025 r.p.m.

16"-3000 sliding head drills are available in floor and bench models, and with multiple-spindle arrangements up to 6 spindles. Six spindle speeds are provided.

The Royal line of Cincinnati Drills includes both 16" and 18" sizes in floor, bench and multiple-spindle arrangements. They meet the demand for general purpose, sensitive drills capable of production work at a minimum investment.

For complete information and prices, write on company letterhead for the name of your nearby Cincinnati Dealer. Cincinnati Lathe & Tool Co., 3263 Disney, Cincinnati 9, Ohio.

lathes and drills

REVERSIBLE and NON-REVERSIBLE

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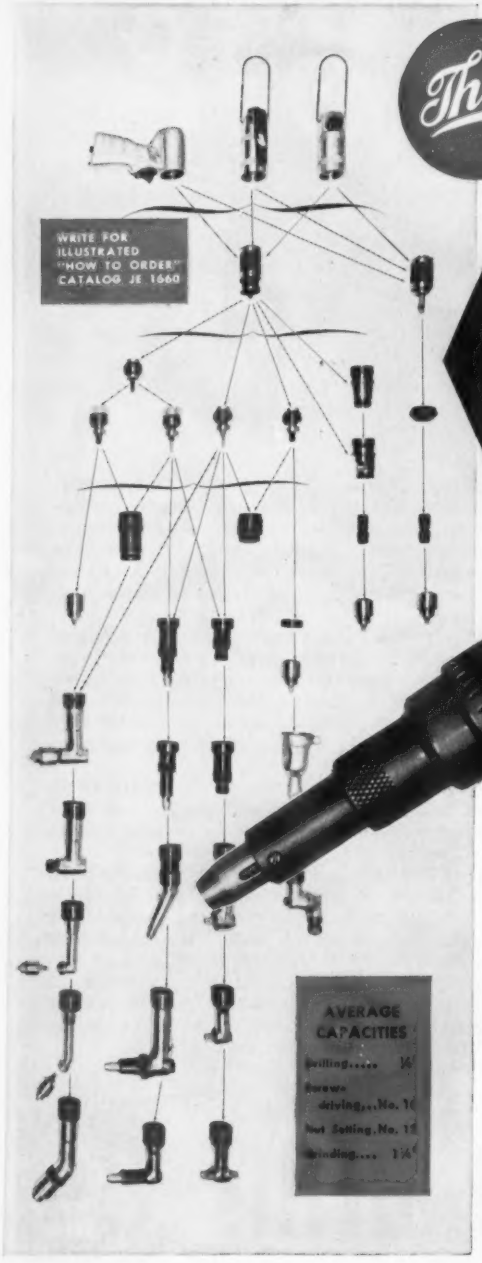

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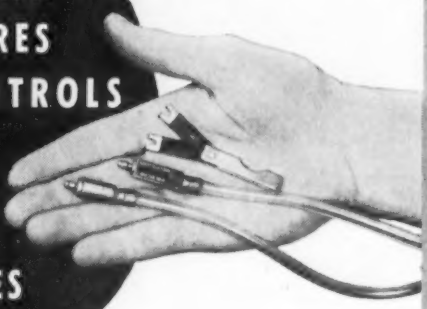

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The Oliver ACE requires no computation . . . its direct reading for clearances eases operators' jobs in grinding the most difficult cutters. Extremely accurate, the ACE has only one sliding part with ample bearing, efficiently protected from dust. Surpassing the usual requirements for precision, speed and economy, the Oliver ACE is especially qualified for the grinding of tungsten-carbide and high speed milling cutters and tools — jobs it tackles with amazing ease.

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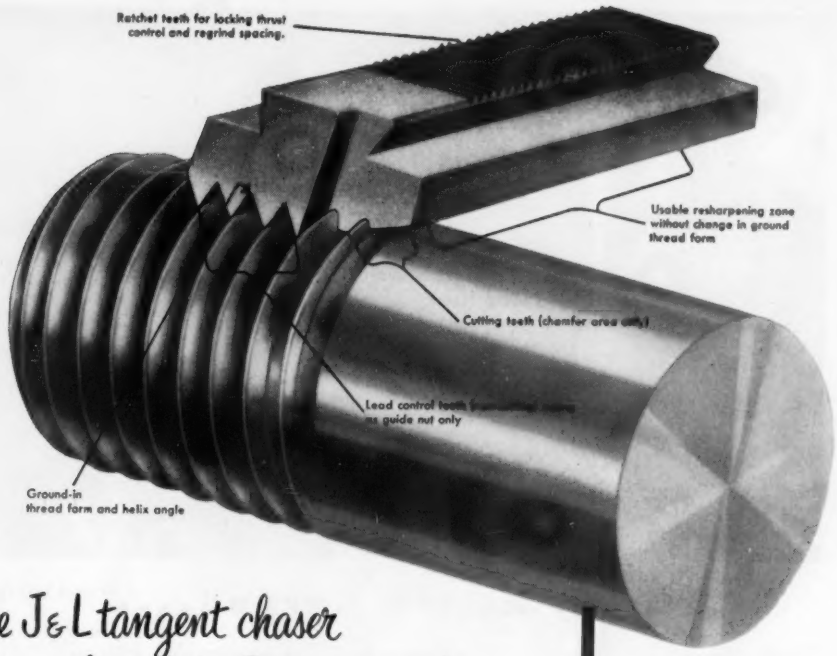
Ratchet teeth for locking thrust control and regrind spacing.
Usable resharpening zone without change in ground thread form
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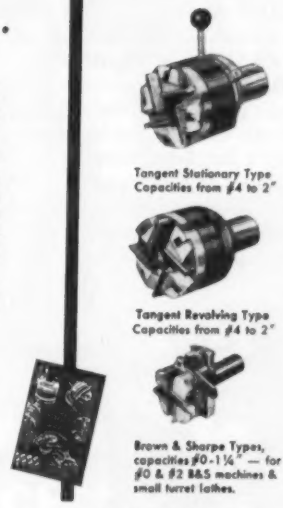
the J&L tangent chaser threading System assures...

... ease of operation ... maximum accuracy and tool economy — by means of a true tangent method of thread cutting exclusively developed by Jones & Lamson.

All four chasers in the set are positioned tangent to the work, making them cut like any other end cutting form tool. J&L tangent chasers have the thread form ground in at the exact helix angle for the size and pitch being threaded. Cutting action is confined to the chamfered area and the first full tooth in a set. The non-cutting teeth, purposely end ground above center, act as a precision lead nut. The non-cutting teeth on all four chasers act as a steady-rest and help control the lead with extreme accuracy. Class III guaranteed. *This means important savings regardless of your tolerance requirements.*



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Capacities from #4 to 2"

Tangent Revolving Type
Capacities from #4 to 2"

Brown & Sharpe Types, capacities #0-1¼" — for #0 & #2 B&S machines & small turret lathes.

J&L Automatic Opening Die Heads and Chasers assure low initial cost — ease of operation — controlled resharpening — use of carbide where applicable. Class III threads guaranteed.

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MORE: Rubber-cushioned Brightboy is now obtainable not only in either the aluminum oxide or silicon carbide grain, but each of these compounds comes in *grain sizes* ranging all the way from *extra coarse to extra fine*, in *soft, firm and tough rubber binders.* You have a Brightboy abrasive exactly "matched" to the job!

In these days of rising costs and tougher competition, the *savings* and the *finish* you get from Brightboy count for more than ever! Brightboy's unique, rubber-cushioned action achieves a fast, *quality* finish that's frequently the "final." The action is not only an entirely new revelation in finishing, but also offers far more than other methods in versatility and adaptability.

Ask your dealer *now* for Brightboy literature. Advise us if he cannot supply you. Write us on any problem where finishing is involved.

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America's Pioneer Manufacturers of rubber-bonded abrasives.

Wheels, Sticks, Rods, Blocks for machine and manual operations

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RUBBER CUSHIONED ABRASIVES

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Pipe, tube and structural bending is now simplified with a PEDRICK PRODUCTION BENDER. Heretofore difficult bends, such as offsets and off-plane bends, can now be made in production quantities at an amazingly low cost. All PEDRICK PRODUCTION BENDERS are complete with motor, and are equipped with automatic duplicate bending relays.

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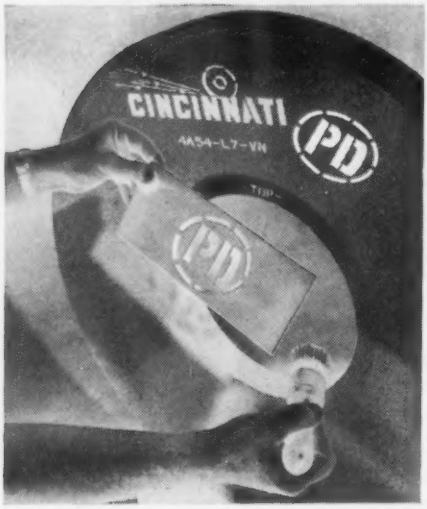

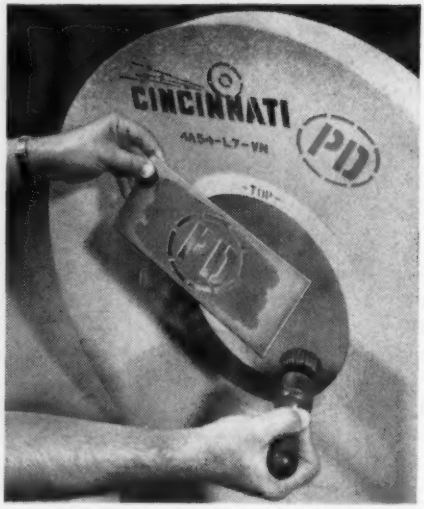

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Cincinnati Grinding Wheels offer

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The CINCINNATI (PD) Manufacturing Process is the greatest grinding wheel development in years—an achievement in precision manufacturing and quality control that means a brighter working picture for you.

Through the CINCINNATI (PD) Manufacturing Process, you can be *positive* that *every* CINCINNATI (PD) Wheel you order will be produced exactly to the Cincinnati grading specified for your job.

And, just as a negative guarantees exact duplication of a photograph, the CINCINNATI (PD) Manufacturing Process assures a POSITIVE DUPLICATION of the original wheel EVERY time you reorder.

The problem of duplication has been a major concern of Cincinnati Milling throughout its 30 years of practical experience in using grinding wheels, and in supplying industry with precision grinding machines equipped with grinding wheels and ready for production operation. Cincinnati Milling found that once the right grinding wheel had been specified for a particular job, sometimes it was difficult to secure additional wheels of identical grading that would duplicate the performance of the original wheel. The need for positive duplication in the manufacture of grinding wheels is of utmost importance not only to Cincinnati Milling, but to every user of grinding wheels.

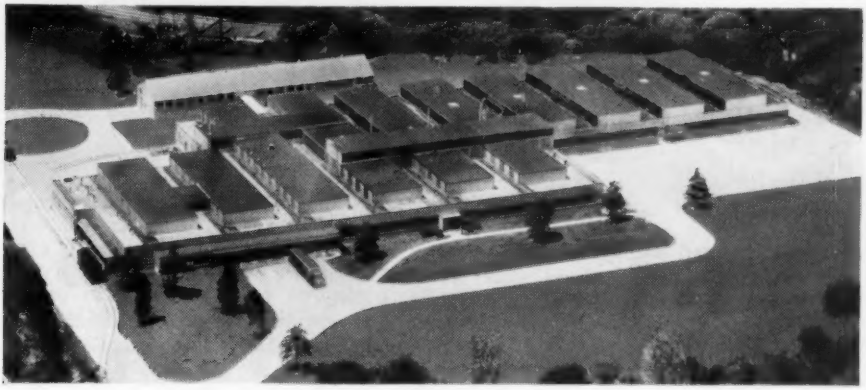
Positive Duplication (PD) is the result of extensive manufacturing research which revealed that *several steps* in the production of grinding wheels generally considered as unimportant, were quite to the contrary, *extremely important*. As one step toward (PD) Wheels, Cincinnati Milling constructed the world's most modern, most completely equipped grinding wheel plant. Some of the equipment installed has never before been used by the industry in the manufacture of grinding wheels.

Then, to make (PD) Wheels an actuality, Cincinnati Milling developed new standards of manufacture with 36 quality control steps. From the weighing of the grain and bonding material, through molding, drying, firing, finishing, to final inspection, every operation is

carried out with the same exactness as in building a precision machine tool.

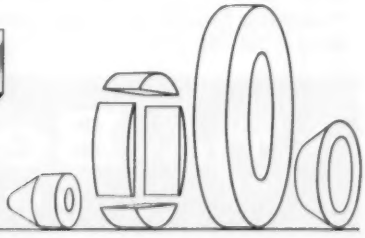
You're assured a POSITIVE DUPLICATION of the original wheel EVERY time you reorder. "On grade" with a CINCINNATI (PD) Wheel means all future (PD) wheels will act and grind exactly alike. For you, this means *no more* production interruptions which cut output and increase your costs.

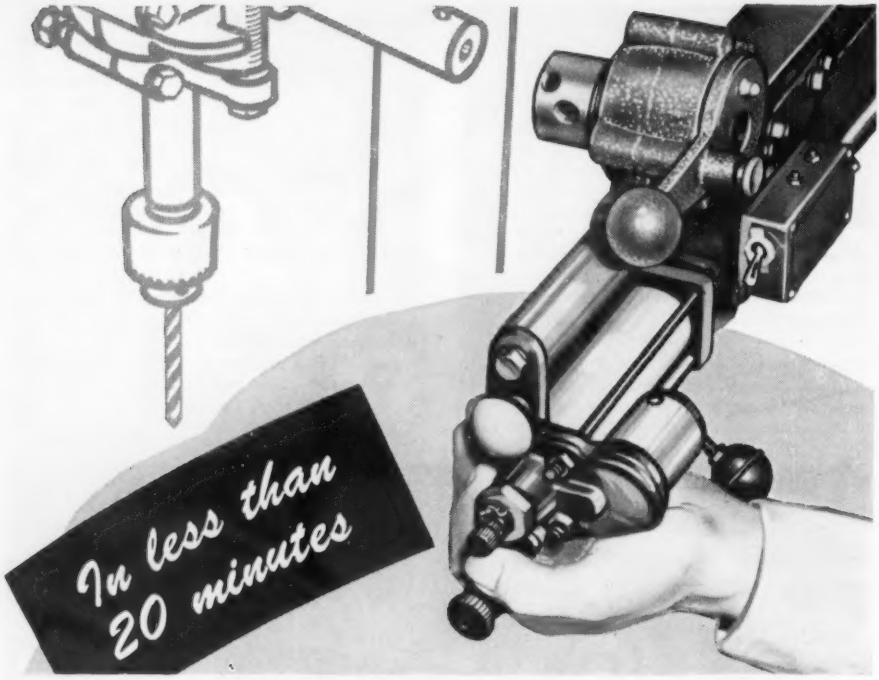
Let us prove to you how CINCINNATI (PD) Wheels will make money for you. Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



The CINCINNATI (PD) Manufacturing Process was made possible by this plant —the world's most modern grinding wheel plant.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio





Yes, in less than twenty minutes, you can install a Bellows Drill Press Feed on your standard hand fed Drill Press and cut your cost of drilling holes often in half.

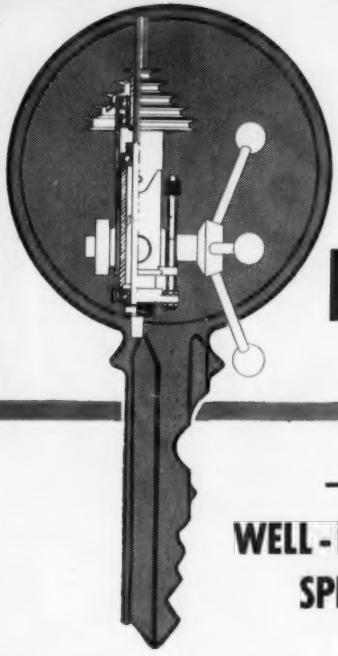
The Bellows Drill Press Feed attaches to the star wheel shaft of the drill press. At a touch of the operating lever, the Feed advances the cutting tool quickly to the work — feeds it into the work at a properly controlled feed rate and thrust — automatically returns the tool to starting position.

You save three ways: rapid advance and retract mean more parts per hour; controlled feeding of tool means fewer rejects, longer tool life; the reduction of operator fatigue means uniformly high production throughout the shift.

Write for Bulletin DF-110R
free on request

Address: Dept. MMS 754
The Bellows Co., Akron 9, O.

The Bellows Co.
AKRON 9, OHIO



KEY TO A BETTER DRILL VALUE

—A WELL-DESIGNED SPINDLE

Note the long-life, accuracy and ease of operation designed into the spindle assembly of a "Buffalo" No. 15 Drill, above. Spindle is alloy steel, machined to close tolerances, ground and polished. Spindle and pulley turn smoothly without end play, on precision "sealed-for-life" ball bearings. Pulley and spindle are so accurately fitted to the spindle that up-and-down action is almost effortless, yet without play. WRITE TODAY for Bulletin 2963-G—see these and other features that mean lower cost output for you, with better-built "Buffalo" Drills!

"Buffalo" No. 15 Heavy-Duty Bench Drill

BUFFALO FORGE COMPANY

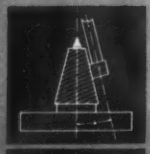
388 BROADWAY BUFFALO, NEW YORK

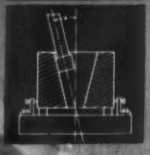
CANADIAN BLOWER & FORGE CO., LTD., Kitchener, Ont.

"Buffalo"

DRILLING • PUNCHING • SHEARING • BENDING

52″ swing plus...



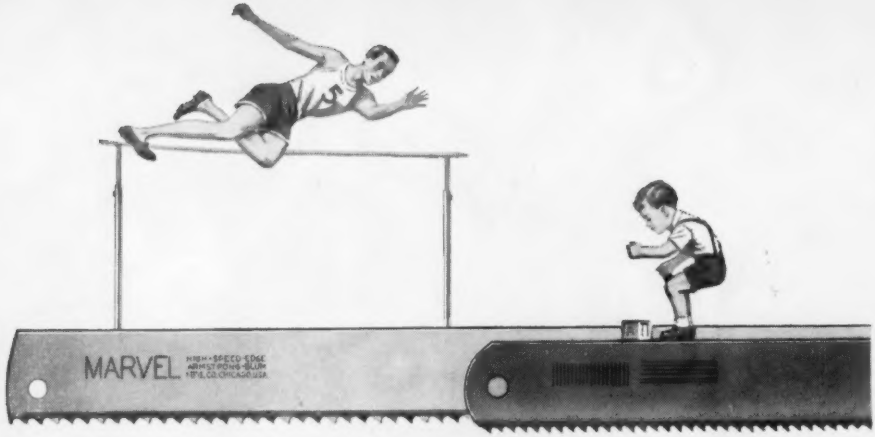


. . . plus 27½″ grinding head stroke, 24¾″ clearance over face plate, 42″ diameter face plate—on Springfield's new Vertical Universal Grinder. The work piece on the grinder here is a washing machine agitator mold, 43″ corner to corner. A tapered hole through it must match a conical male part (small illustration). One angle setting of the head ground both male and female taper for perfect fit. It had been planned to hand-lap them, a week's task. Springfield's time: 4½ hours.

Other Springfield Vertical Universal Grinders—swings 21″ and 30″. Lathes—toolroom, engine, contouring, reproducing—14″ to 32″. Write for name of nearest Springfield dealer.

67TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO



. . . but

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* SAWS

Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

Fig. 1. Details of arbor construction and location of 22 cutting tools.

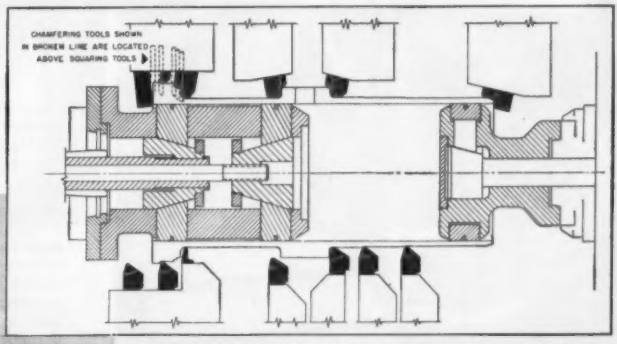
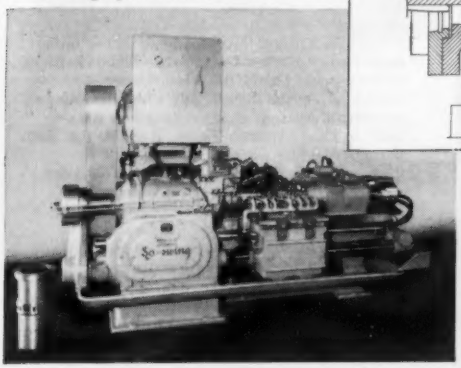


Fig. 2. Model R-18 Lo-swing Lathe equipped for machining large cylinder liners.



MODEL R-18 AUTOMATIC Lo-swing LATHE MACHINES LARGE CYLINDER LINERS AT FAST PACE

Problem: To turn outside diameters, face shoulders and chamfer large cylinder liners 11-1/2" diameter by 22" long.

Solution: The large swing Model R-18 Automatic Lo-swing Lathes selected for this job were equipped with special tailstocks and tooling engineered for this particular job.

The work is held and driven by a special driver, mounted on the headstock spindle, which has two rows of six, air-operated driving jaws. Each row is operated by its individual pull bar (Fig. 1) thus equalizing the air pressure on both sets of jaws. In order to avoid distortion and provide increased support, both sets of jaws grasp the work piece where the wall thickness is greatest.

The relieving type tailstock has a 20 inch stroke, operated by a motorized lead screw, permitting easy removal of the cylinder sleeves from the long driver. Its large revolving spindle is fitted with an air-operated, ring type expanding arbor which supports the work at the tailstock end.

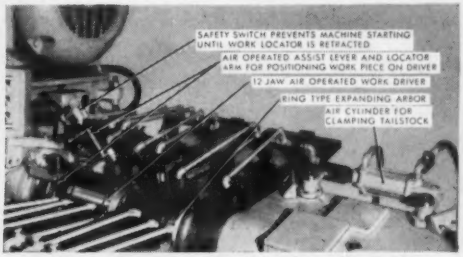

SAFETY SWITCH PREVENTS MACHINE STARTING UNTIL WORK LOCATOR IS RETRACTED
AIR OPERATED ASSIST LEVER AND LOCATOR ARM FOR POSITIONING WORK PIECE ON DRIVER
12 JAW AIR OPERATED WORK DRIVER
RING TYPE EXPANDING ARBOR
AIR CYLINDER FOR CLAMPING TAILSTOCK

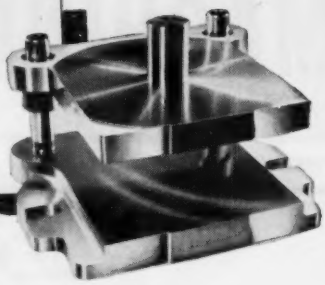
Fig. 3. Close-up view of special tooling and tailstock.

The work is located in relation to the ports previously cut around the liner body by a locator arm (Fig. 3) which enters one of the ports when swung downwards. The operator then positions the piece on the driving arbor with an air-operated assist lever which holds it tight against the locator until the driving jaws grasp it. A safety switch above the locator arm prevents the machine being started with locator in engaged position.

A 60 HP motor drives the machine. Floor to floor time is 5.2 minutes, demonstrating the substantial economies possible with Lo-swing methods. Let Seneca Falls engineers assist with your turning problems.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

World's fastest die set service in action



Here's where faster die set service begins, on Danly's high speed precision production lines . . . the finest mass production facilities in the die set field.

Here's where your order is received . . . in one of Danly's Branch Plants. Because all die components are close at hand, your order is filled immediately.

Now—Danly unites mass production techniques with the precision touch of craftsmanship to bring you the fastest die set service . . . ever.

Never before has there been a die set service as fast as the one that Danly now offers to you. Unique in concept, the system had its beginning some years ago when Danly originated its network of nationwide Danly Branches. Under such a system the main Danly Plant in Chicago provided thousands of *interchangeable* die set parts to Danly Branch Plants. It meant that such parts were easily assembled into standard die sets and then quickly delivered to meet the requirements of any tooling program.

But, as buyers recognized the convenience of Danly service, demands on the Chicago Plant grew to exceed capacity. The solution? . . . an unprecedented move in the die set field. Danly put die set manufacture on a mass production basis with no sacrifice of famous Danly precision. It was accomplished with amazing new facilities in the form of two complete production lines devoted exclusively to high speed, precision die set production. The next time you put one or a dozen Danly Die Sets on order, expect to get fast delivery from any Danly Branch, expect to get die sets unequaled in precision. You can expect it and you'll get it . . when it's Danly.

DANLY

DIE SETS . . STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

Fast, nationwide delivery from these plants

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***CLEVELAND** 14	1550 East 33rd Street
***DAYTON** 7	3196 Delphos Avenue
***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY** 1	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
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**Indicates complete stock.*

The Aircraft Industry requires a mobile source of oil-absorbing wiping material. Wipers must be strong for heavy work, soft for polishing fine metals.

The Electrical Equipment Industry needs a versatile wiper. Dusting or cleaning, Scott Wipers are adaptable for huge armatures or fragile condensers.

From aircraft to utilities

Scott Industrial Wipers bring a new standard of safety and efficiency to Industrial Wiping

Today, all over the country, companies are changing to this entirely different wiper—the Scott Industrial Wiper.

Scott Wipers now make wiping a scientific step in production—measurable in terms of cost, safety and efficiency. For example, Scott Wipers do away with laundering costs. And for the first time, you can budget your wiping operation.

Use coupon or call your Scott representative for more details.

Scott Industrial Wipers—another Scott product that is changing America's way of doing things.

SCOTT PAPER COMPANY
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Send details on Scott Industrial Wipers.

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POWER PLUS —

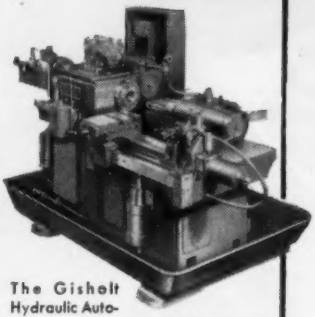
at 2000 blows a minute!

The new CP Universal Electric Impact Wrench's powerful impact action runs nuts or screws . . . and taps faster and easier. Designed with a 2" diameter nose for tight spots, it's rated at ⅜" bolt size capacity but in most cases has a bonus capacity of ⅝". One-hand operation is afforded by its centered pistol grip and reverse switch in the handle. And the reverse switch interlock prevents reversing while running. Has a "unitized" motor which assures long life plus resistance against vibration.

Chicago Pneumatic *8 East 44th St., New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

why this No. 12 HYDRAULIC AUTOMATIC LATHE



The Gisholt Hydraulic Automatic Lathe is a genuinely rugged 12" lathe, suited for light, fast jobs. Handles chucking, between centers, or fixture-held work.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

maintains GREATER ACCURACY

Here, feed pressures are applied directly to tools without intermediate cams, arms or other linkage. Accuracy is further insured by feeding against dead stops. In all cuts there is a moment of dwell during which cuts are cleaned up.

Front carriage is mounted on and driven by the massive bar to which it is clamped. Wide lateral support of carriage assures rigid alignment without tremble or tremor.

Movement of the massive rear slide is by hydraulic piston in the base of the slide itself.

Both carriages are directly supported by the massive integrally cast cabinet type bed, and all bearing surfaces, ways and gibs are hardened and ground steel to assure permanent accuracy.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

It's a cuttin' fool!

Light heavy-weight cutting torch *It's a* ***TRIPLE THREAT***

NEW

Smith's Cutting Torch

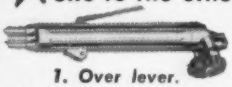
Does the work of a heavy-duty torch but is LIGHT and easy to handle

Cuts anything from tomato cans to 14" steel (using proper tips). Yet it is light-weight and perfectly balanced. A brute for performance but easy on the operator. We put into this torch what you and other operators asked for.

Slip-In-Tips—no wrenches needed.

Just slip the tip in, spin the nut with your fingers and you're ready to go. How could anything be easier? Try it yourself and see.

3 inter-changeable controls—quick change from one to the other in less than 1 minute



1. Over lever.

2. Trigger.

3. Under Lever as shown at right

No matter what type of cutting jet control you prefer, you have it in this torch—and you can switch from one to the other any time you want. Adaptable to any personal likes or techniques. Reduces number of torches needed to accommodate all operators' requirements.

No slag . . . cuts clean.

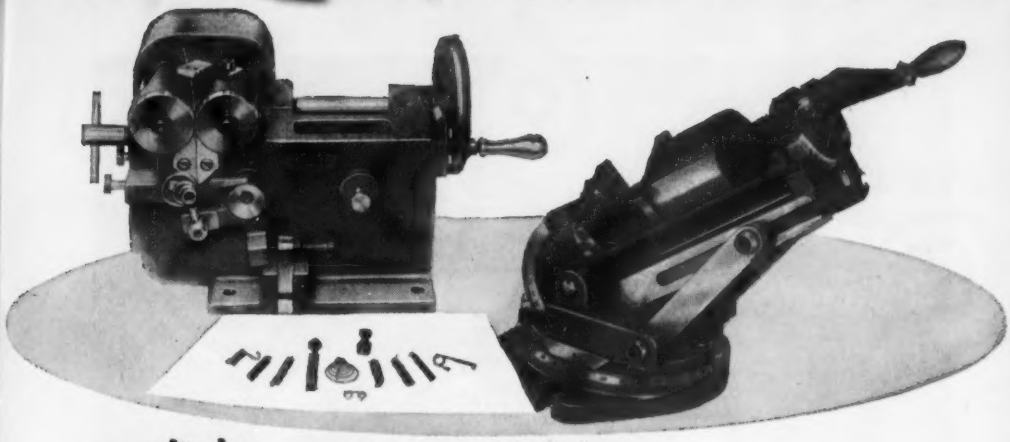
The new Smith Tips with this torch give you clean, knife-line cuts with narrow kerf and almost complete absence of slag. Operator does not have to waste time cleaning up his cuts. Speeds up production. Want a demonstration?

This new torch ingeniously combines more operating advantages than any you have ever seen. Trade tests to date have been sensational.

Write for details

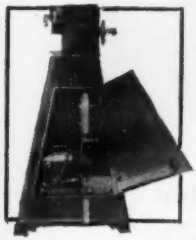
SMITH WELDING EQUIPMENT CORP.

Dept. MMS-161 2633 S. E. 4th St. Minneapolis, Minn.

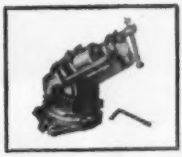


spotlight on two precision, time-saving, labor-saving tools

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005″ to .125″, you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of arbors, yet turn out precision springs — torsion, compression, extension tapered, or special springs — coiled either left or right hand, in any desired length, any diameter from 1/16″ to 12″ and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. Make them fast right in your own shop!



Power model for continuous runs, on welded steel console base.



Accurately set in all three planes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only 7″ high (lowest in the trade), **OMNI-VISE** #4, shown at top, is tough, weighs 74 lbs. Jaws are 4″ x 1½″, open to 4″. Base is 9″ in diameter with one side straight. Inset shows **OMNI-VISE** #2, a precision low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height, 4¾″. Jaws, 2⅛″. Opening, 2⅛″. Base, 7¼″ x 5″. For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.

EXCLUSIVE DISTRIBUTORS OF PRECISION MACHINE TOOLS

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CIRCUIT AVENUE
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CONNORS AND DAVIS *Sales Corporation*
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Please send detailed information and prices on:

PERKINS SPRING COILER
hand ☐ power ☐

OMNI-VISE #4 ☐ #2 ☐

Name _____ Title _____

Company _____

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Here's a Proved way to set High-Standards in Design

When you've been around for 30 years you're bound to earn some sort of reputation. That's happened to Norma-Hoffmann bearings, and, in thousands of blueprints it gets put down in "blue and white" like this: *Norma-Hoffmann or equal.*

Designers tell us there are extra values in these bearings. That they can specify Norma-Hoffmann and right there a worry is off their minds.

We have certainly set up high enough standards to assure delivering these extra qualities. There's no secret how. It's explained in one word: *precision.*

NORMA-HOFFMANN
Precision
BEARINGS
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION
Stamford, Connecticut — Founded in 1911
FIELD OFFICES: Atlanta • Birmingham • Charlotte • Chicago • Cincinnati
Cleveland • Dallas • Detroit • Kansas City • Los Angeles • San Francisco • Seattle

No BUTTS about it...

CIMCOOL with "95-59" eliminates rancidity and foul odors

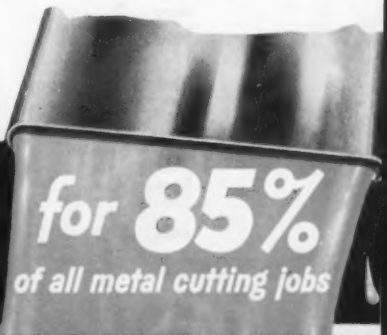
If the odor in your plant these days is "getting your goat"—then you'll want to know about this important discovery:

Actual scientific laboratory and shop tests prove—beyond any doubt—that CIMCOOL with "95-59" eliminates rancidity and foul odors . . . and is positively non-irritating to the skin!*

Plant after plant reports that this radically new and different coolant—this *chemical emulsion*—is the biggest working improvement in years. The amazing ingredient "95-59" is a more effective bactericide, is non-corrosive, and eliminates rancidity and foul odors—*even in the hottest weather.* That's why CIMCOOL, in contrast with old-fashioned cutting fluids, can be kept at work longer. Thus, CIMCOOL greatly reduces downtime and labor costs for cleaning and changing.

Let us prove that there are no ifs, ands, *or* butts about CIMCOOL'S superiority. For a demonstration in your own machines, just write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

*Trade Mark Reg. U.S. Pat. Off.



CIMCOOL

for 85% of all metal cutting jobs

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Life of These Punches Went Up

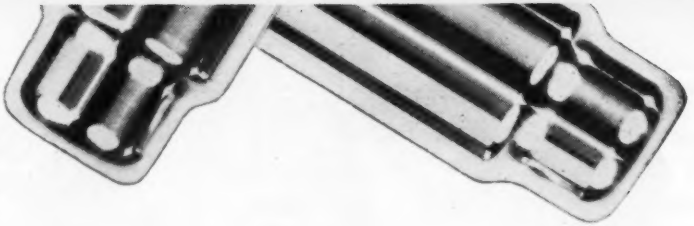
350%

with

Ludlum DBL-3

High Speed Steel

Application of Special Heat Treatment Did the Trick:

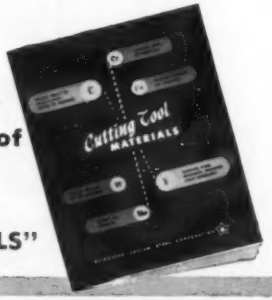


These DBL-3 punches (2⅞" dia. by 10½" long) are used to draw and flatten hot or cold rolled stock .140" thick. With conventional heat treatment, their performance was 25% better than Material B and 50% better than Material C. But A-L Metallurgical Service recommended the *additional* heat treatment listed below, improving the performance of DBL-3 to 150% over B *and 350% over Grade C!*

1. Carburize at 1950°F
2. Oil Quench
3. Draw at 1025°F
4. Draw at 1025°F again
5. Finish grind
6. Draw at 750°F to relieve grinding stress
7. Nitride 72 hours at 950°F (case depth of approx. .015)

Ludlum DBL-3 holds a fine grain over a wide hardening range. With its higher carbon and vanadium content, it also has better abrasion resistance than other standard high speed tool steels. Our Metallurgical Service is ready to help improve *your* production operations, too. Just call our nearest branch office, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.*

Write for your copy of "CUTTING TOOL MATERIALS"



This 36-page booklet analyzes and compares all A-L grades: carbon, high speed, cast alloy and carbides. Includes data on handling and treatment . . . invaluable for production men.

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TWO NEW GAGES

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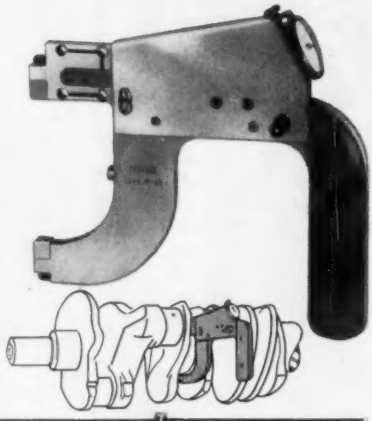
INDICATING CRANKSHAFT GAGE MODEL 1340 P-40

BUILT ESPECIALLY FOR CRANKSHAFT JOBS and similar work, this thin gage gets in between shoulders or close beside bearings and its flat anvils of Tungsten Carbide permit accurate measurements of such critical dimensions. Measurements are transferred from the sensitive anvil to the CONVENIENTLY PLACED INDICATOR through the integrated pantograph unit. Free of all friction, inertia and side play, this unit also counteracts the weight of the gage and operator's hand.

No matter what the position of the throws, Model 1340 P-40 easily measures bearing diameters in the narrow spaces between shoulders of a crankshaft.

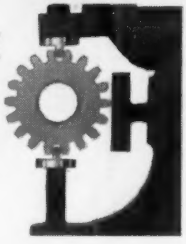


PITCH DIAMETER AND SPIRAL GEAR GAGE 202 SERIES

FOR USE IN STATISTICAL QUALITY CONTROL right at the machine as well as final inspection, these gages check pitch diameter of spur gears, helical gears, splines, and chain sprockets. Both upper and lower contacts are of Tungsten Carbide. The upper contact is adjustable for 1" on all five regular sizes and swivels so it seats properly in relation to the lower anvil before being locked in position. The adjustable rear guide positions the gage on the gear, assuring gaging the proper spaces between gear teeth which may be either even or odd in number.

For complete information on these new tools, write today to Federal Products Corporation, 4147 Eddy Street, Providence 1, Rhode Island.

Gear centered properly by rear guide and cylindrical contacts.



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Years of successful experience in special tooling and related production problems are yours for the asking. When the job requires special cutting tools, call in your National Tool Co. representative. He is backed by more than 49 years experience in the engineering and manufacture of special cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

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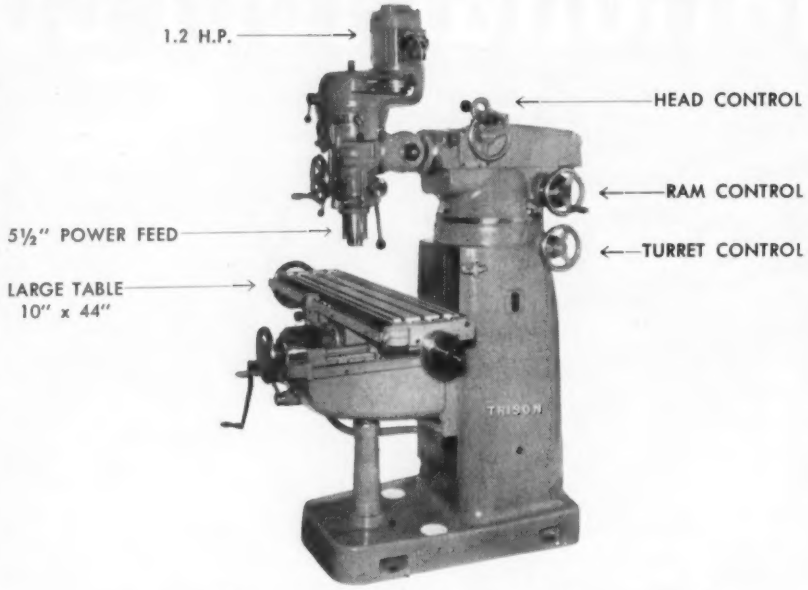
TRISON TURRET-TYPE VERTICAL MILLING MACHINE



This machine has features, the combination of which is found in no other miller.

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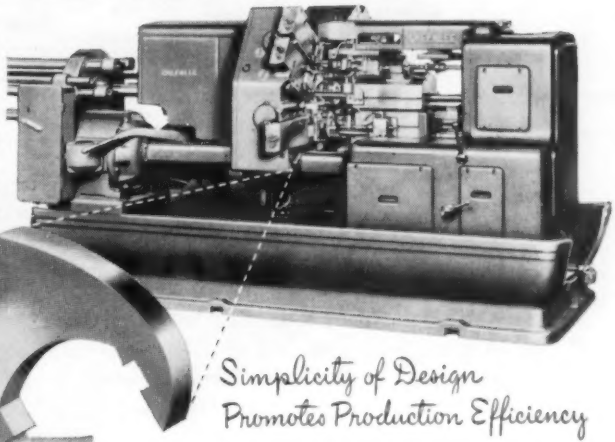
GREENLEE *Automatics*

INTERCHANGEABLE CROSS-SLIDE CAMS

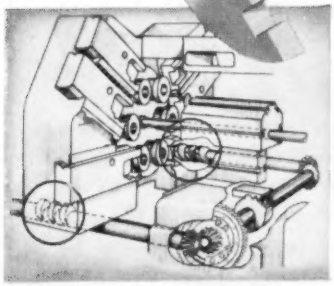
On Greenlee Automatics, cross-slide cams are fully interchangeable—any cam can be used to move any cross-slide. Drive for the cams is arranged in such a way that the cross-slide travel is in a selected ratio to the travel of the main slide. Standard cams are available to provide a wide range of ratios.



In the average job shop, a set of only 15 standard cams will provide enough flexibility to take care of 90% of the jobs that will come through. Standard ratios range from 1½:1 to 8:1.

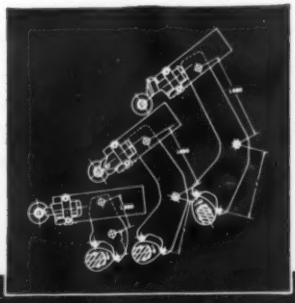
Simplicity of Design Promotes Production Efficiency

The distinctive Greenlee cross-slide cam design and operating features promote production efficiency on many short-run jobs because they reduce changeover time. In addition, there is an economy of investment.



As shown at the left, cross-slide cams are located at the sides of the machine, under the open ends of the cross-slide housings, where they are easily accessible.

As shown at the right, each cross-slide is operated independently by a separate cam, making it easier to split up operations and arrange better tooling set-ups.



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PRODUCTION MACHINERY

GREENLEE

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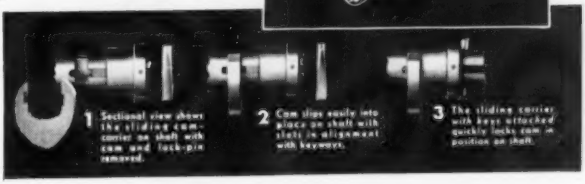
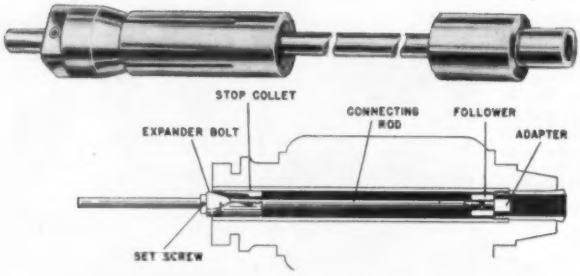
1887 MASON AVE., ROCKFORD, ILL.


1 Sectional view shows the sliding cam-carrier on shaft with cam and lock-pin removed.
2 Cam slips easily into place on shaft with slots in alignment with keyways.
3 The sliding carrier with keys attached quickly locks cam in position on shaft.

SAVE YOUR LATHE CUT-OFF TIME

WITH THE

KNAPP COLLET STOP



For any size manual or automatic lathe. Accommodates pieces within 5″ of entire length of headstock draw tube and collet combined. Expanding collet located in drawtube furnishes positive and immovable lock. To install: Place work piece in desired position in lathe collet and close collet. Insert stop and lock it; push connecting link of stop forward until it contacts work piece. Tighten set screw—GO TO WORK.

Stack the 12 ft. bars in hacksaw—cut 50 to 200 pieces at a time by just releasing saw vise—pulling stock forward and closing vise; 2 to 3 minutes man time while cutting same quantity in lathe would consume 3 or more hours. With KNAPP COLLET STOP in lathe, place work piece in collet. A quick facing operation and every piece MUST be IDENTICAL regardless of the variation of the hacksaw and, likewise, all lateral cuts MUST be IDENTICAL for the action of the collet PULLS THE WORK PIECE BACK AGAINST THE COLLET STOP instead of away from the stop as when using a turret stop.

Send us inside diameter and length of draw tube and collet. If lathe has fingers extending beyond end of draw tube, state length of this overhang. We will send you proper size stop on 30 DAYS FREE TRIAL. Absolutely no obligation on your part but to return if you do not wish to keep it.

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performance and features equal to or surpassing machines costing up to 58% more!

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with a free chart comparing these 22 specifications on 8 leading mills!

- Price
- Working Surface
- T-Slots—number and width
- T-Slots—center distance
- Swivels
- Longitudinal Power Feed
- Cross Power Feed
- Vertical Power Feed
- Spindle Center Line to Top of Table—Max.
- Spindle Center Line to Top of Table—Min.
- Column to Brace
- Column to Inside Arbor Support
- Arbor to Underside of Overarm
- Taper Hole • Nose Diameter
- Hole Through Spindle
- Speeds • Speed Range
- Feeds • Feed Range
- Power • Weight

Features and dimensions are easy to compare . . . and so is performance, backed up by user reports stating that Greaves 2H plain and universal milling machines outperform mills costing almost twice as much!

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Write for your copy of this eye-opening comparison chart

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Please send me: ☐ the Comparison Chart
☐ Tool Lease and Deferred Payment Plans.

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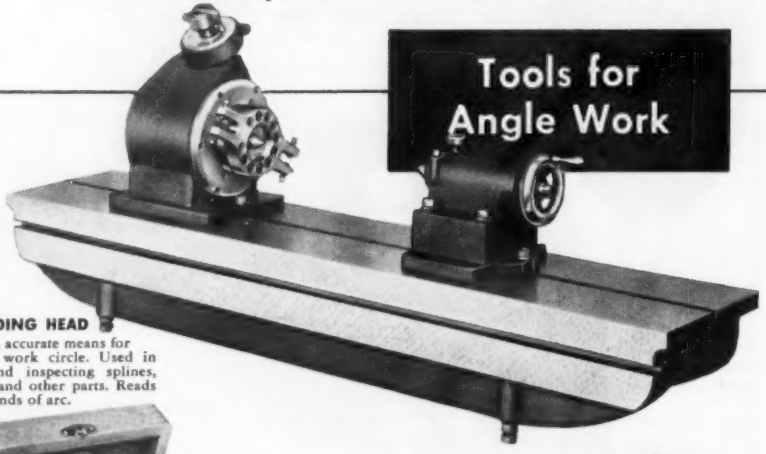
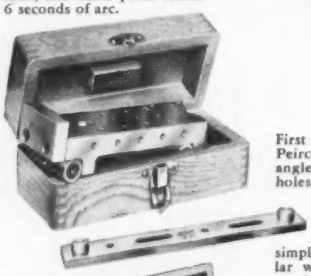
Increase Production Range and Capacity

with these

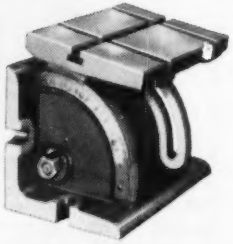
TAFT-PEIRCE Specialties for Precision Work



T-P DIVIDING HEAD
offers a rapid, accurate means for dividing the work circle. Used in measuring and inspecting splines, gears, cams, and other parts. Reads within 6 seconds of arc.

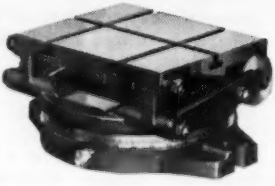


T-P SINE BARS & SINE BLOCKS
First conceived and built by Taft-Peirce, they locate work to any given angle within very close limits. Tapped holes permit clamping.



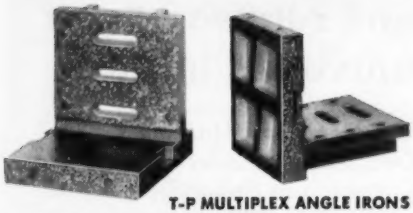
T-P TOOLMAKER'S ADJUSTABLE KNEE
simplify inspection or setup of angular work. Graduated quadrant and vernier reads to 5 minutes of angle.

T-P ANGLE BLOCKS
speed setup and grinding of small angular work on a magnetic chuck. Can be used individually or in any combination to form V-blocks.



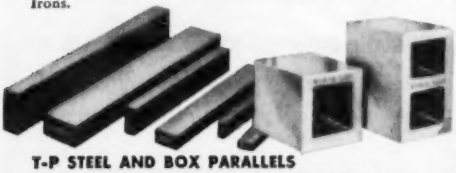
T-P ADJUSTABLE ANGLE PLATE
tilts and turns. Makes compound angles easy to setup for machining. Both tilting table and rotating base are graduated from 0 to 90 degrees in each direction.

Reference Surface Tools



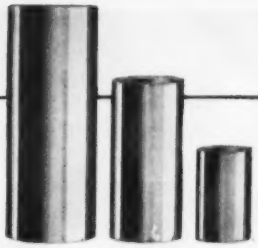
T-P MULTIPLEX ANGLE IRONS

All surfaces are scraped accurately flat for faster, easier setups. Other types available include Duplex Angle Irons, Slotted Angle Irons, Toolmaker's Knees, and Measuring Irons.



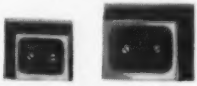
T-P STEEL AND BOX PARALLELS

are available in a complete line of stock sizes. Also, Planer and Boring Machine Parallels, Levelling Straight Edges, and Steel Straight Edges.



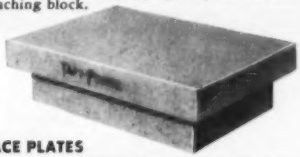
T-P CYLINDRICAL SQUARES

Used with T-P Surface Plate they provide a convenient, accurate reference line for any vertical work-surface.



T-P UNIVERSAL SQUARES

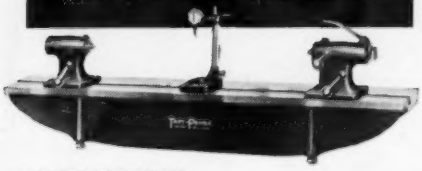
High precision squares that can be used in any position. Hard rubber center facilitates gripping . . . prevents hand heat from reaching block.



T-P SURFACE PLATES

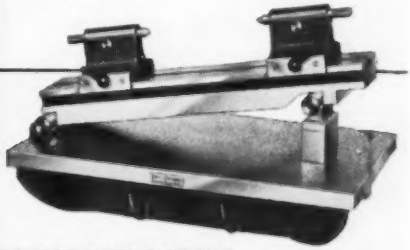
Extremely fine grain of T-P granite surface plates gives smoother more wear-resistant surface, assures top precision over longer periods. Cast Iron surface plates also available.

Versatile Inspection Tools



T-P BENCH CENTERS

simplify inspection work. Have unusual rigidity and permanent accuracy. This is typical of a wide range of inspection tools available at Taft-Peirce.



T-P TAPER TESTING FIXTURE

combines a Sine Block with a pair of adjustable mounted precision centers. Checks tapers to high degree of accuracy.

For the complete story on these items and many more, get your copy of the Taft-Peirce Handbook.

T-P COMPARATOR SQUARE

permits accurate indication of squareness. Adaptable to both production and inspection work.

T-P means Top Precision

THE TAFT-PEIRCE MANUFACTURING COMPANY

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The Geargrind Universal Oscillating Grinder will perform a wide range of grinding operations. Its initial cost is much lower than would be expected for a grinder with so many specialized uses.

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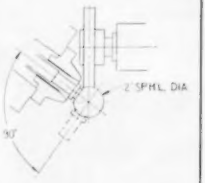
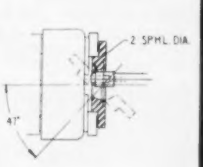
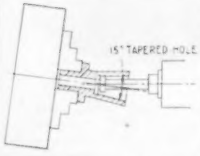
Typical examples of work performed on the Geargrind Universal Precision Grinder



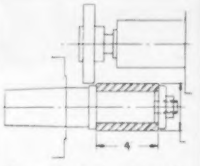
Ball stud, alloy steel, carburized and hardened. Held in a collet.



Flanged ball socket, cast iron. Held in a diaphragm chuck.



Grinding wheel adapter. Grinding the tapered hole. Held in a precision 4-jaw chuck.



External cylindrical grinding.

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PRECISION PRODUCTION EQUIPMENT

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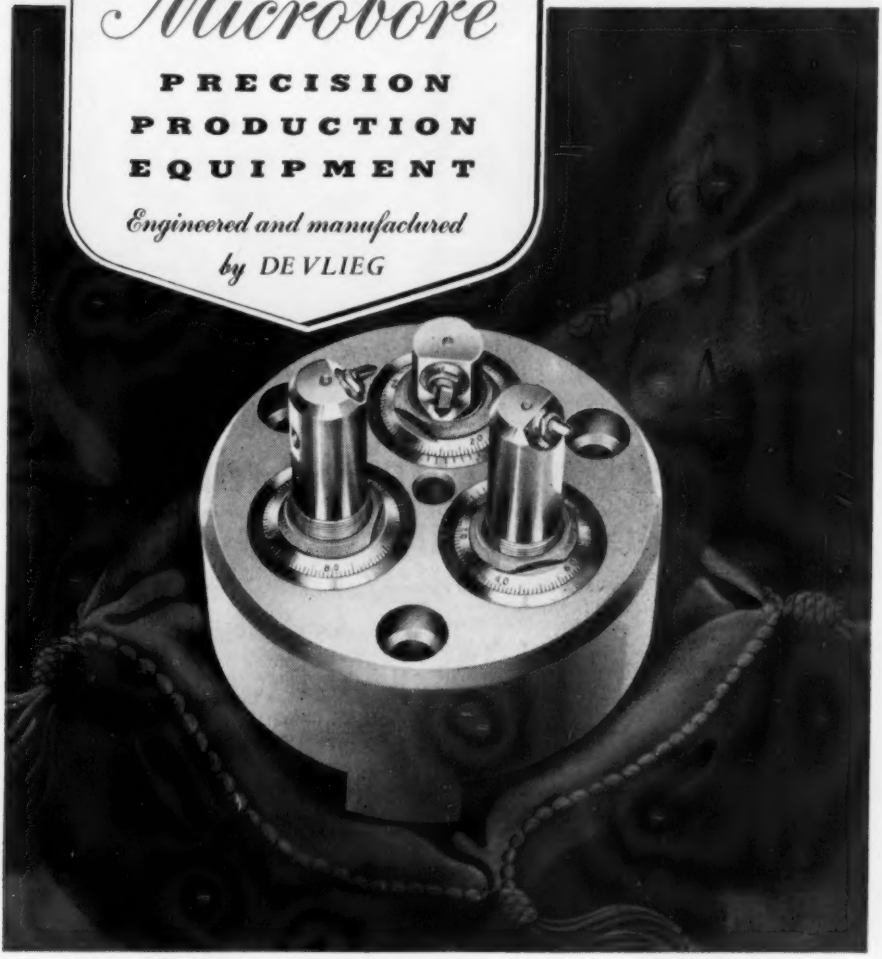

Courtesy of the Emerson Electric Mfg. Co., St. Louis, Mo.

Illustration shows Microbore cluster tool furnished to Emerson Electric Co., for finish turning O.D.—finish boring I.D. and facing operations at one pass. Standard Microbore units are arranged to provide micrometer vernier adjustment for both radial and linear settings of the cutting tools.

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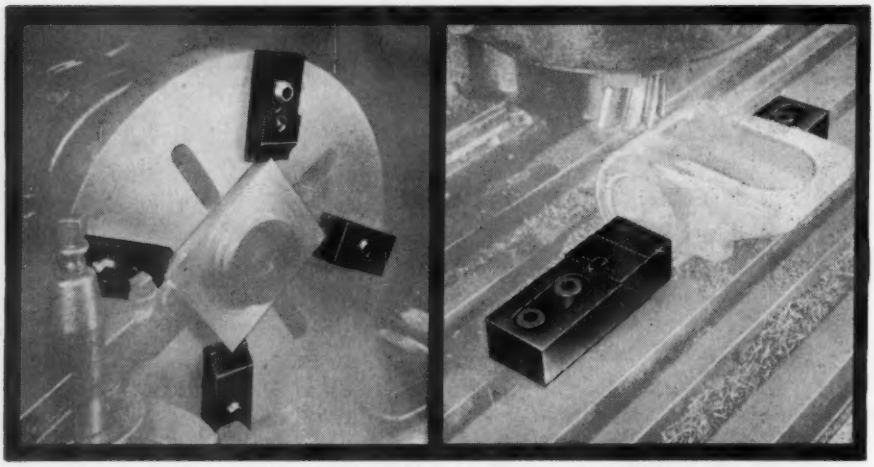


J & S "ALL-PURPOSE" JAW CLAMPS CAN BE USED ON ALL STANDARD TYPES OF MILLING MACHINES, LATHES, PLANERS, BORING MILLERS, DRILL PRESSES, AND OTHER MACHINE TOOLS

How to secure workpieces with ease, cut handling time up to 75%

J & S "All-Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools—save as much as 75% of the time required with outdated methods.

Downholding Principle

J & S' *downholding* principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

Need no U-clamps or straps

With J & S "All-Purpose" Jaw Clamps, you can avoid the use of U-clamps and straps, disregard different length studs and blocking. You can also minimize obstructions in set-ups, reduce cut-off waste. You can pass over J & S Jaw Clamps 1" from the working surface of the machine face. The whole surface of the workpiece can be machined to within ⅛" of the face plate or table.

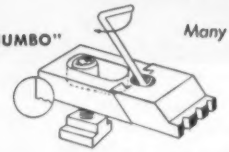
You can get J & S "All-Purpose" Jaw Clamps in a variety of sizes Write for complete information today

J & S "JUMBO" and "LI'L GIANT" JAW CLAMPS

For large planers

Many times more powerful than finger set-ups

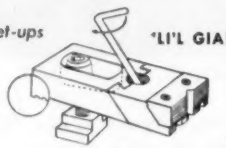
"JUMBO"



FORM RELIEVED

COMPLETELY HARDENED

"LI'L GIANT"

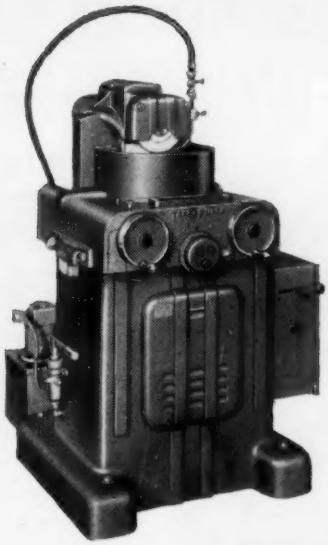


Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. 1/16" back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage

J&S TOOL CO., INC.

WHEEL DRESSERS · JAW CLAMPS PRECISION VISES · SINE BARS · DOWN-HOLDING DEVICES

645 W. MT. PLEASANT, LIVINGSTON, NEW JERSEY



The Taft-Peirce 6" Rotary Grinder with .0001" vernier for super-precise rotary grinding.

The Taft-Peirce No. 1 Precision Surface Grinder with .0001" vertical and cross feed verniers for the highest degree of accuracy, flatness, and finish on plane surfaces.

When you want the *Ultimate in Accuracy* try this trio

The accumulated skill of the world's most experienced tool and gage makers has gone into these three machines . . . all originally developed *for our own gage production.* Each has been designed and built with the ultimate care to give the ultimate in accuracy, flatness, and finish. If accuracy is *your* problem . . . let us tell you about the unusual features of these machines.

The Taft-Peirce 24" Lapping Machine for that last critical element of precision super-finish on plane or cylindrical surfaces.

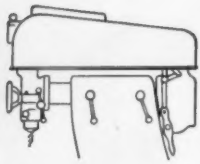
THE TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

T-P *means* Top Precision

NEWEST OF THE U. S.-BURKE SUPER-VALUE MACHINE TOOLS

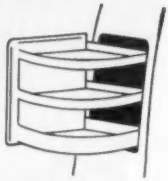
THE ECONOMICAL ANSWER TO ACCURATE, VERSATILE VERTICAL and ANGULAR MILLING

"U. S." VERTICAL Milling Machine



Balancing of head and motor and very substantial column provide increased rigidity and accuracy.

Another feature is the built-in spot light which assures maximum visibility at most vital points.



Swing-out shelves handily house tools right in the column of the machine.

Thoroughly tested on the job by many of America's foremost manufacturers.

Created by America's foremost producers of small milling machines, to fill the big need for a balanced-head vertical miller that provides greater capacity and flexibility than is normally associated with machines of its type.

The new U. S. Vertical ideally combines most advanced engineering, experience of practical machinists and modern design without sacrifice of basic characteristic "U. S." simplicity.

COSTS SURPRISINGLY LITTLE

Quickly pays for itself by simplifying or taking over vertical milling and boring jobs which often tie up far more costly standard machines.

SEND FOR COMPLETE DETAILS

Illustrated literature which describes complete specifications, capacities, exclusive features and advantages gladly furnished on request.

U. S. BURKE
MACHINE TOOL DIV.

Brotherton Rd. 3
Cincinnati 27, O.

Note these LEHMANN Boring Tools in use at the CATERPILLAR TRACTOR CO.

Photo courtesy Caterpillar Tractor Co.

LEHMANN Boring Bars used for rough and finish boring in these blocks for cylinder liners

Here's another manufacturer — Caterpillar Tractor Co., Peoria, Illinois — who use Lehmann Boring Tools for precision boring. The bars above, made by Lehmann, bore a block for cylinder liners used in Caterpillar's D 386 and D 397 Diesel Engines. The Lehmann bars rough and finish bore for a close tolerance fit of the liners.

This is another example of how Lehman's engineering and designing skill, put to work for special boring needs, can give accuracy and efficiency to the boring operations on your production line.

Depend on LEHMANN Boring Tool for . . .

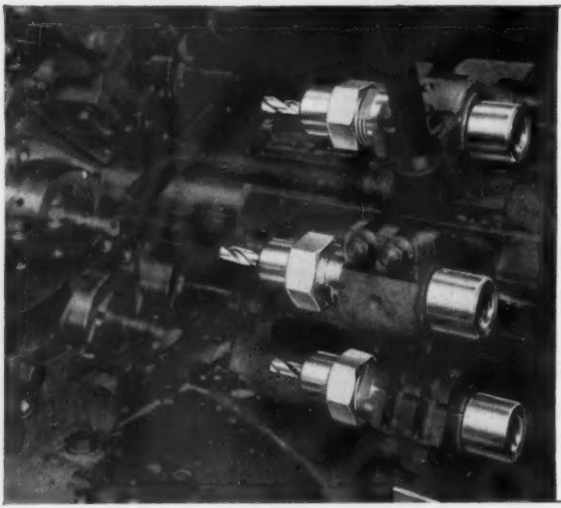
- **Top engineering experience — 35 years approved by industry.**
- **Skilled machinist experience to give efficient, accurate, precision tools every time.**
- **Help cut machinery time to a minimum and put utility and economy in your boring operations.**
- **To stop costly errors in tool setting — tools are especially designed and engineered to your needs.**

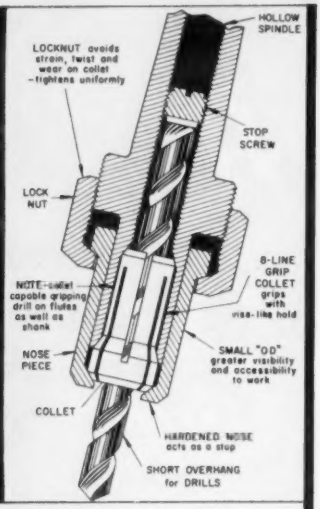
LEHMANN BORING TOOL

4389 DUNCAN AVE. ST. LOUIS 10, MO.

Tell us your problems without obligation—or—write today for CATALOG BT-12.

DIVISION OF NOVO ENGINE CO.




HOLLOW SPINDLE
LOCKNUT avoids strain, twist and wear on collet —tightens uniformly
STOP SCREW
LOCK NUT
8-LINE GRIP COLLET grips with vise-like hold
NOTE—collet capable gripping drill on flutes as well as shank
NOSE PIECE
SMALL "OD" greater visibility and accessibility to work
COLLET
HARDENED NOSE acts as a stop
SHORT OVERHANG for DRILLS

Precision or Quantity Runs
Cost Less when you use Erickson chucks!

After all, these precisely machined chucks are scientifically designed to extend machine accuracy right down to the very end of the tool. No other chuck can guarantee equal accuracy. With Erickson accuracy you frequently reduce the number of operations.

Guaranteed accuracy of .0005" and superior gripping power of Erickson collet chucks assure proper drill alignment. Drills then cut evenly on both cutting lips permitting faster machine feeds and proper speeds . . . give more holes per grind.

Production run records prove that Erickson chucks repay your investment in less than a month, often in the first week of operation. That's why we can confidently state that *Erickson chucks actually cost you far less!*

Here's why!

1. More holes per grind.
2. Guaranteed accuracy of .0005".
3. Collet collapses over a range of 1/32" replacing seven standard single purpose collets.
4. Grips drills on flutes permitting stubbing and use of broken drills.
5. Permits greater feeds and speeds.
6. Gives better tool performance and extends tool life.
7. Reduces set-up time.
8. Tighter grip with even pressure along entire length of collet.

REDUCED TOOL COST, FASTER OPERATION and GREATER ACCURACY mean lower production costs for you. Send for your copy of our new Catalog K today! You'll find many interesting applications for all Erickson holding tools. Let an Erickson field engineer show you actual case histories.

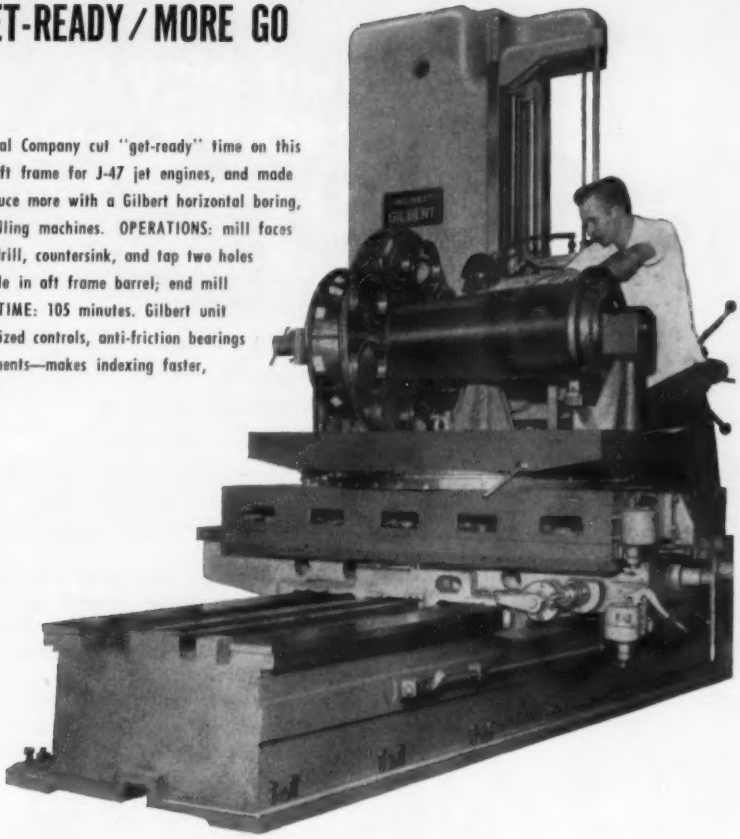
ERICKSON TOOL COMPANY

2304 Hamilton Avenue • Cleveland 14, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

LESS GET-READY / MORE GO

Ryan Aeronautical Company cut "get-ready" time on this stainless steel aft frame for J-47 jet engines, and made "go" time produce more with a Gilbert horizontal boring, drilling, and milling machines. OPERATIONS: mill faces of lifting pad; drill, countersink, and tap two holes in pad; drill hole in aft frame barrel; end mill three scallops. TIME: 105 minutes. Gilbert unit head has centralized controls, anti-friction bearings on hand adjustments—makes indexing faster, operation easier.



"Those who buy Gilbert buy Gilbert again" because of the efficiency of the single spindle and unit head design, ample capacity for most boring requirements, plenty of power for fast and heavy cuts with carbide tools, sustained accuracy in long, hard service. 3½-inch spindle, table and floor type boring mills available in a wide variety of arrangements. Write for Bulletin 953.

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO

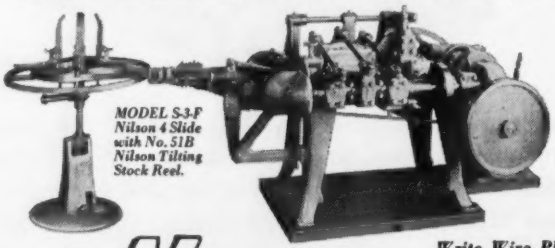
"Switching to NILSON 4 SLIDES Saved us $17,656 on metal alone"

Yes, simply by changing stamping methods, this NILSON Customer profited 4 ways:

1. Production increased 80%.
2. 72% less metal used (per 4 million pieces).
3. Greatly improved quality with minimum of rejects.
4. Strengthened competitive position with greater profit margin.

You, too, can enjoy these advantages in producing your own wire forms and small metal stampings. Parts such as illustrated in the margin were straightened, fed, pierced, blanked, swaged, stamped or coined, cut-off and formed AUTOMATICALLY in NILSON 4 SLIDES in one quick precise operation. *ONE* Machine. *ONE* Operator.

NILSON 4 SLIDES available in wide range of sizes: forming Wire up to ½" diam. in feeds to 32" max. and Metal Ribbon stock up to 3½" wide. Press sections 5 to 30 ton capacity. Heavy Duty Types in 50 and 75 ton models.



MODEL S-3-F Nilson 4 Slide with No. 51B Nilson Tilting Stock Reel.

THERE'S NOTHING LIKE A **NILSON**

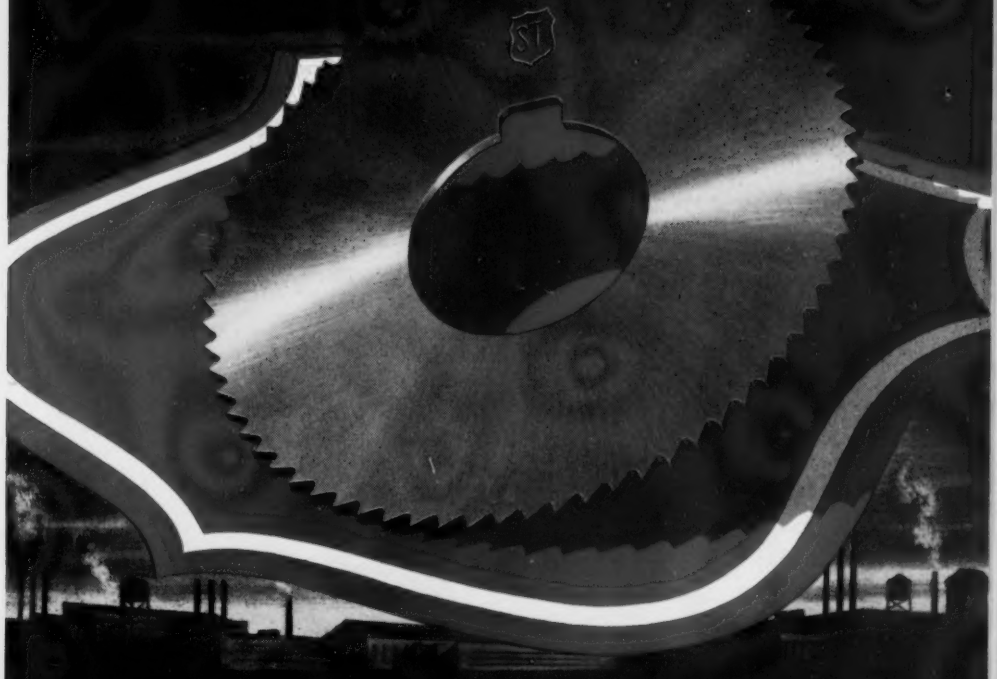
Write, Wire, Phone for full particulars.

THE A. H. NILSON MACHINE COMPANY

1514 Railroad Avenue • Bridgeport 5, Connecticut

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Strip Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

"STANDARD for tough jobs since 1881"



Red Shield says:

Call your Industrial Supply Distributor for Shield Brand Slotting Cutters.
Specialized factory service available everywhere.

STANDARD TOOL CO.

3950 CHESTER AVENUE CLEVELAND 14, OHIO

FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE: *Twist Drills · Reamers · Taps · Dies · Milling Cutters · End Mills · Hobs · Counterbores · Special Tools*

Here's what the **SUNNEN** folks wrote us recently about their Sidney Lathes:

SUNNEN PRODUCTS COMPANY

Automotive Service Equipment · Precision Honing Machines

7910 MANCHESTER AVENUE ST. LOUIS 17 MISSOURI

Our 16" Sidney has proved to be everything Sidney said it would be.

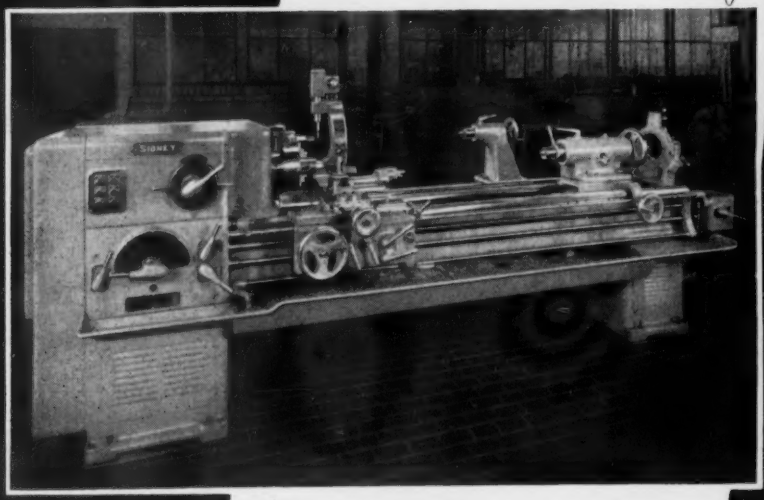
We have made many odd shaped dies and it will duplicate as accurately as a master part or template.

The Sidney is also easy to operate, the height is just right and all levers are conveniently located.

It is a real pleasure to operate a Sidney.

George Maechling
Tool Room Foreman

Cordially,
SUNNEN PRODUCTS COMPANY
Geo Maechling



SIDNEY FLUID TRACER LATHES

For you . . . as well as for Sunnen Products Company of St. Louis and scores of other leading makers of precision equipment . . . Sidney Lathes can do a terrific job . . . ECONOMICALLY!

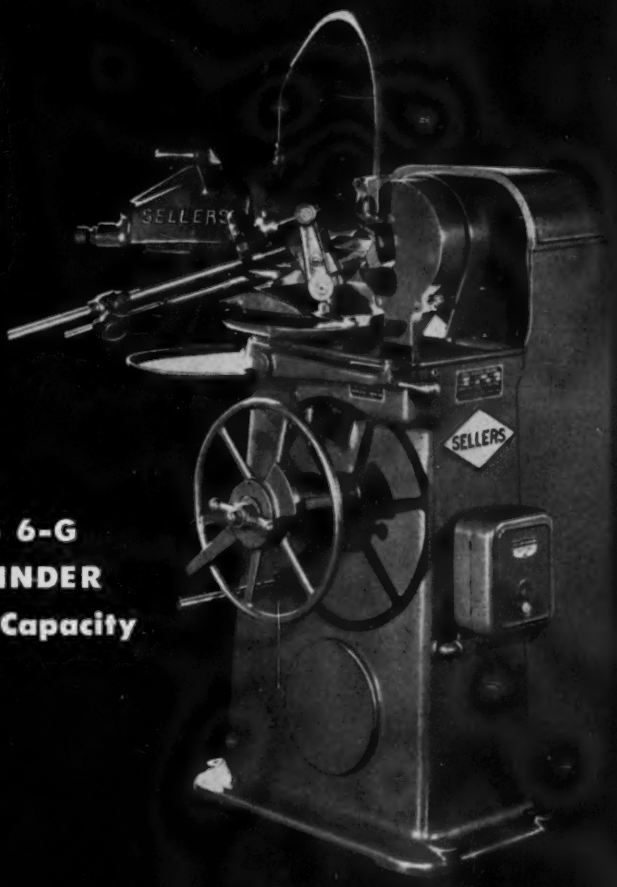
The sensitive tracer head transfers every change in contour from any master piece or template to the cutting tool. A separate control switch turns off the tracer motor while the machine is performing standard lathe work.

WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

Almost every new twist drill that comes into your shop has been ground on a Sellers Drill Grinder!



The
SELLERS 6-G
DRILL GRINDER
5/16" to 3" Capacity

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

WHOLLY OWNED SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

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Automotive Service Equipment · Precision Honing Machines

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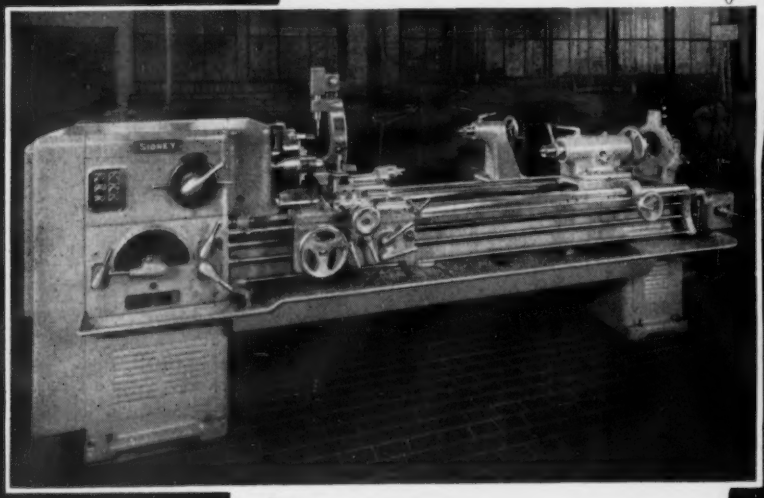

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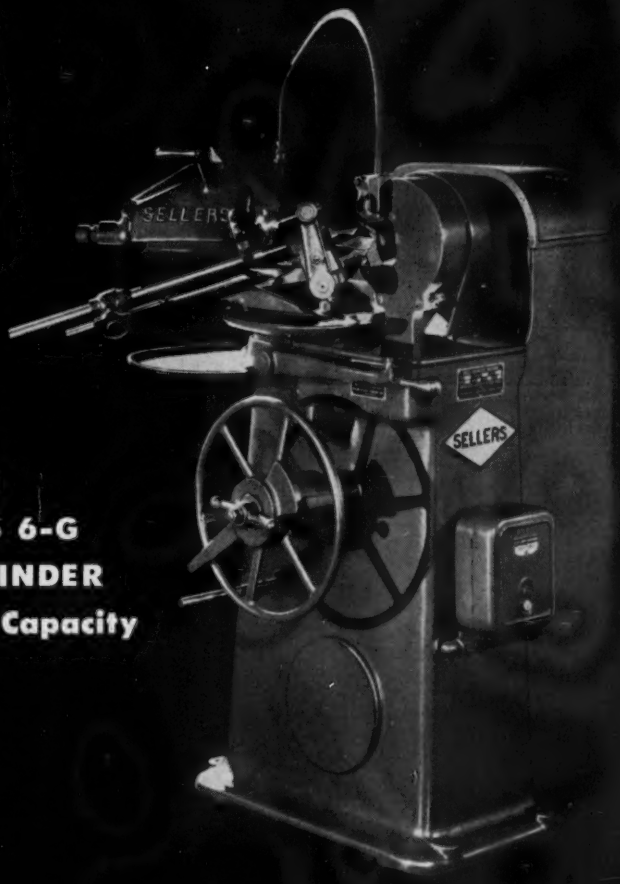

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SELLERS 6-G
DRILL GRINDER
5/16" to 3" Capacity

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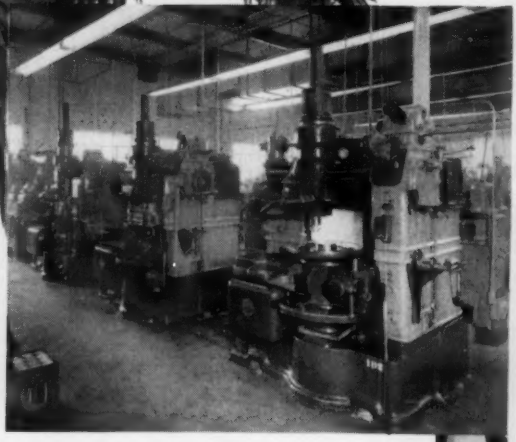
MACHINE TOOL CORPORATION

WHOLLY OWNED SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

PRECISION



Above: *Three of the 6-A Type Gear Shapers in line with a No. 12 Fellows Shaving Machine at the Frohman #1 Plant in Miami.*

Above left: *An additional 6-A and a battery of 7-A and 7-Type machines at the same plant.*

At right: *The line-up of 3-Inch Gear Shapers and No. 4 Fellows Shaving Machines face each other in efficient-handling proximity.*

Fellows

Pays Off
under MIAMI's Sun, too!

A reputation for Extra High Quality Gears can make itself known against a Florida background as readily as anywhere 'up north'...Harry Frohman found it so when he located his Frohman Manufacturing Co. in Miami—equipped the shop with Fellows machines, tooled up with Fellows Cutters and began making the plant a prime source of good gears. Aviation and instrument gear contracts, in particular, have flowed in Frohman's direction *for very good reason.*

Samples of gears in current production with the specified tolerances, etc., are illustrated here, along with the line-ups of Gear Shapers on which they are cut. The invisible ingredient is the very low percentage of rejects which so largely contributes to cost economy.

Whether in Miami, Milwaukee, or Monterey, the Fellows Method is a sound approach to keeping costs *down* and quality *up*. For specific machine or method information, wire, write or telephone the nearest Fellows office.

TYPICAL GEAR JOBS

The gear items pictured and detailed here are selected from hundreds in production and scheduled for early delivery from the Frohman Plant.

Description	Ext. Gear and Spline	Ext. Gear and 2 Int. Splines	Ext. Spline and Int. Spline	External Gear
Pitch Diameter	7.375"	3.036"	4.2182"	4.833"
Diameter Pitch	16 and 20/30	9.881, 20/40 and 11	32/64 for both	24
No. Teeth	118 and 30	30, 29, and 28	137 and 112	116
Press. Angle	25° and 30°	22½°, 30° and 20°	30°	14½°
Material	Nitralloy 135 Mod.	SAE 9310	SAE 8740	Alum. Bronze
Limits	.0005"	.0005"	.0005"	.0005" TIR
Notes	Spline cut after hardening to Rc 32/36	20/40 spline cut after hardening	All cutting after hardening to Rc 32/38	Cut @ 4 pc. loading

GEAR SHAPER COMPANY

Head Office and Export Department: 78 River Street, Springfield, Vermont.
Branch Offices: 319 Fisher Building, Detroit 2 • 5835 West North Avenue, Chicago 39.
2206 Empire State Building, New York 1.

You can also

"ROLL YOUR OWN"

TO SAVE MONEY ON SHAPES*

BEAMS against web

ANGLES both legs in

ANGLES leg in

ANGLES leg out

TEES on flange

BARS on flat —on edge

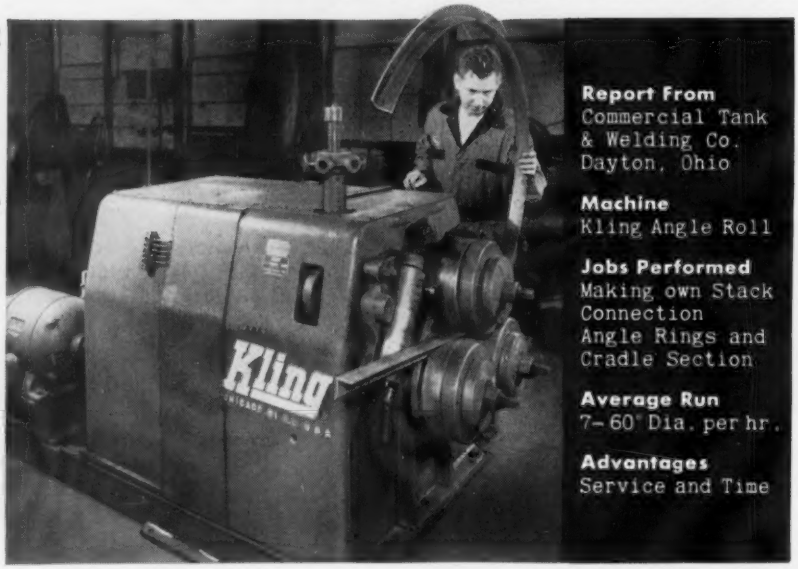
ROUND BARS spiral

RACK teeth out

CHANNELS against web

CHANNELS leg in—leg out

RAILS ball out



Report From
Commercial Tank & Welding Co. Dayton, Ohio

Machine
Kling Angle Roll

Jobs Performed
Making own Stack Connection Angle Rings and Cradle Section

Average Run
7–60" Dia. per hr.

Advantages
Service and Time

**At the side are shown some of the various Shapes you can roll with Kling Angle Bending Rolls*

Kling ANGLE BENDING ROLLS

are used in the **"BEST OF COMPANIES!"*** *—to cut production costs*

Are you paying big prices for formed structural shapes and curved reinforcements like those illustrated? Then investigate the savings you can make by "rolling your own" on Kling Angle Bending Rolls. With these rolls you can also make your own gear blanks, motor housings, wheels, and many other machinery parts.

Kling Angle Bending Rolls are extra heavy construction; hand or power adjustment; designed to handle both angle and flat bars and can be equipped to handle forming of pipe, beams, channels, etc. Recent expansion makes Kling one of the leading producers of rolls of all types, including angle bending and plate bending (pyramid or initial pinch type) rolls.

**Following are some of the companies using Kling Machines:*
American Blower Corporation · A. M. Castle & Company
General Conveyors Corporation · Ford Motor Company
Gleaner Harvester Corporation · The H. M. Harper Company
Johnson-Meier Company · Minneapolis-Moline Company
Richfield Oil Corporation · Joseph T. Ryerson & Son, Inc.
Schreiner Steel Products Company · U. S. Steel Corporation

For detailed description of Kling Angle Rolls send for Bulletin 600.

KLING BROS. ENGINEERING WORKS · 1320 North Kostner Avenue, Chicago 51, Illinois
Export Distributor: Simmons Machine Tool Corporation, 50 East 42nd Street, New York 17, N. Y.

Since 1892 **Kling** ***...an investment in speed!*** **510MMR**

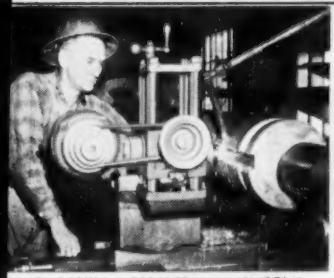
MASTER MACHINE TOOL ATTACHMENTS

Increase Production on LATHES, TURRETS, MILLS

1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

Build Special Production Machines with Master Heads and Independent Feeding Mechanisms! Save Time and Money by Relieving Your Independent Machines!

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, thread milling, boring, drilling, indexing, slotting, and keyseating, internal and external. Performs all operations for maintenance, tool room, and production at a minimum investment.



End Milling 2½" Keyway in 9⅞" Diameter shaft 22-ft. Long

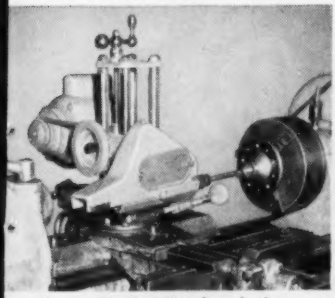
MASTER LATHE CONVERTER is available in four sizes:

Model "C" ½ H. P. — 9" to 13" Lathes
Model "B" ½ or ¾ H. P. — 13" to 18" Lathes
Model "M" 1 to 3 H. P. — 18" to 72" Lathes
Model "H" 5 H. P. — 24" and Larger Lathes

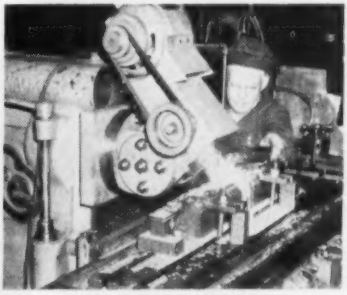
THE REVOLUTIONARY NEW TURRET-MASTER is a small, compact, powered tool head for turret lathes, which powers the tool for either *on* or *off* center milling, drilling or boring, can be assembled for horizontal or vertical spindles. ½ to 3 H. P.

THE GEARED VERTICAL MILL HEAD amplifies operations of horizontal milling machines by combining independent power and double compounded swivel for angular positioning with capacities from ¾ H. P. to 5 H. P.

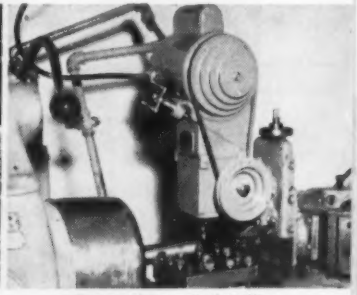
For the cost of one single-purpose machine, you can have several Master units producing. *Prompt deliveries!*



Master Slotting Head on Lathe Cutting Internal Taper Keyway



Geared Vertical Mill Head on a Horizontal Mill



Turret-Master End Milling Keyway on a Turret Lathe

FREE

Ask your nearest Master dealer to show you the new 80-page Pictorial Operational Book. Write direct for free 24-page Catalog.

MASTER MANUFACTURING CO.

1310 EAST AVENUE A • HUTCHINSON, KANSAS, U.S.A.

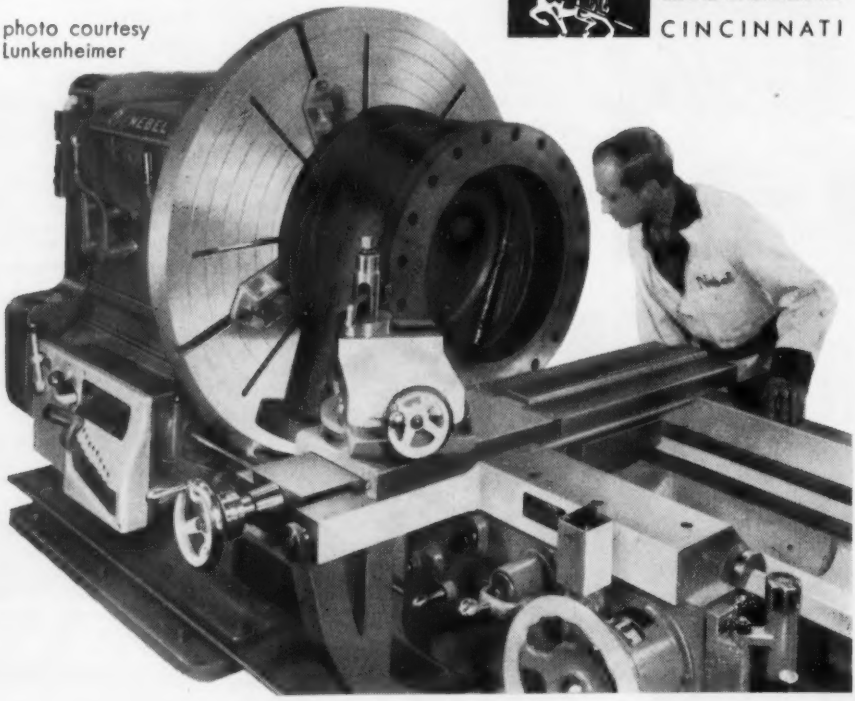
POWER
PRECISION
PERFORMANCE

You get all this plus profitable metal turning from this giant 28″/50″ Nebel 'G' series extension bed gap lathe . . . and from all the other Nebel gap and engine lathes. Sizes 16″ to 50″

Write the Nebel Machine Tool Co., 3409 Central Pkwy., Cin'ti 25, O., for literature, prices, delivery.

Nebel
LATHES
CINCINNATI

photo courtesy Lunkenheimer



Another New Delpark Development

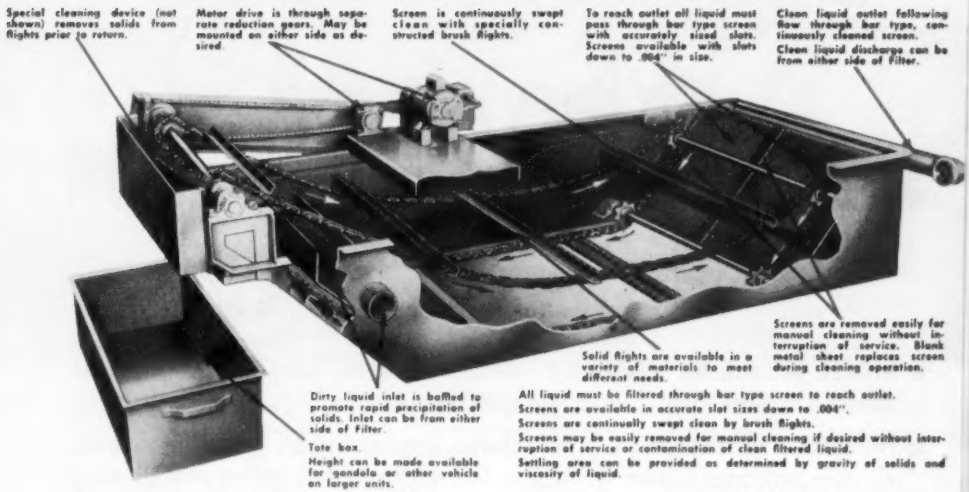
THE

COMBINATION

Delpark Settling and Filter

SYSTEM

FOR CONTINUOUS REMOVAL OF CHIPS, HEAVY SOLIDS AND RELATIVELY FINE SOLIDS TO .004" SCREENING


Special cleaning device (not shown) removes solids from flights prior to return.
Motor drive is through separate reduction gears. May be mounted on either side as desired.
Screen is continuously swept clean with specially constructed brush flights.
To reach outlet all liquid must pass through bar type screen with accurately sized slots. Screens available with slots down to .004" in size.
Clean liquid outlet following flow through bar type, continuously cleaned screen.
Clean liquid discharge can be from either side of Filter.
Screens are removed easily for manual cleaning without interruption of service. Blank metal sheet replaces screen during cleaning operation.
Solid flights are available in a variety of materials to meet different needs.
Dirty liquid inlet is baffled to promote rapid precipitation of solids. Inlet can be from either side of Filter.
Tote box.
Height can be made available for gondola or other vehicle on larger units.
All liquid must be filtered through bar type screen to reach outlet.
Screens are available in accurate slot sizes down to .004".
Screens are continually swept clean by brush flights.
Screens may be easily removed for manual cleaning if desired without interruption of service or contamination of clean filtered liquid.
Settling area can be provided as determined by gravity of solids and viscosity of liquid.

The DELPARK Settling and Filter System is engineered for the filtration of particles .004" or larger. It is made for the filtration of liquids of varying degrees of viscosity containing solids of different particle sizes and widely differing weights. Size of the equipment is dependent upon the settling rate which in turn is governed by the gravity of the solids and the viscosity of the liquid. This factor determines the retention period for a given rate of flow.

Write today for more information on this newest development in DELPARK Industrial Filtration.

Delpark INDUSTRIAL FILTRATION

BACKED BY MORE THAN 30 YEARS EXPERIENCE IN INDUSTRIAL FILTRATION

INDUSTRIAL FILTRATION COMPANY, 13 INDUSTRIAL AVENUE, LEBANON, INDIANA

CUTTING. New S.E.C.O. keeps parts and tools cooler. Tools last longer, require fewer grindings; production is increased; finishes are uniformly good.

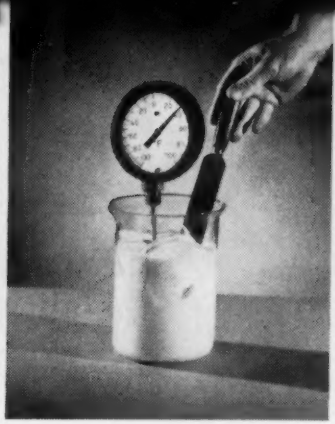
Now Better Than Ever!

Sunoco Emulsifying Cutting Oil

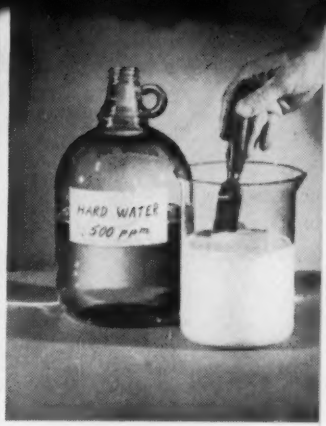
New refining facilities improve industry's most widely used cutting oil and permit it to give these added benefits

- **HIGHER MACHINING EFFICIENCY**—better finishes, longer tool life, increased production in cutting operations
- **INCREASED DETERGENCY**—particularly important in grinding operations—provides better surface finishes, prevents loading and glazing of the wheel, prolongs wheel life
- **BETTER MIXING QUALITIES**—in hot, cold or hard water
- **A PURER, CLEANER CUTTING OIL**—whiter, more stable emulsions; cleaner parts and machines; better operator acceptance
- **EASIER HANDLING**—pumps from storage tanks more readily, flows from drums faster
- **GREATER VERSATILITY**—can be used for rolling, washing and rust-proofing as well as cutting and grinding

MIXES IN HOT WATER
This new S.E.C.O. mixes and remains stable even at 180 F., permitting its use in washing and rustproofing.



MIXES IN COLD WATER
New S.E.C.O. forms stable emulsions in the coldest water . . . even ice water does not affect it.



MIXES IN HARD WATER
New S.E.C.O. eliminates the need for special hard-water grades of emulsifying cutting oil.

GRINDING. New S.E.C.O. improves surface finishes because its increased detergency prevents loading and glazing of grinding wheels, prolongs wheel life.

RUSTPROOFING. New S.E.C.O. is a better hot rust-proofing medium. It forms stable emulsions, coats metal parts uniformly, protects them against rusting.

WASHING. Because of its increased detergency and its ability to mix and remain stable in hot water, New S.E.C.O. is better for removing grease and dirt.

TEST THIS NEW S.E.C.O. IN YOUR OWN PLANT. For more information, call your nearest Sun office or write SUN OIL COMPANY, Phila. 3, Pa., Dept. MM-7.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

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PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

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FROM J&B

1. 4-PURPOSE PRECISION PANTOGRAPH

The *"Panto-Miller"*

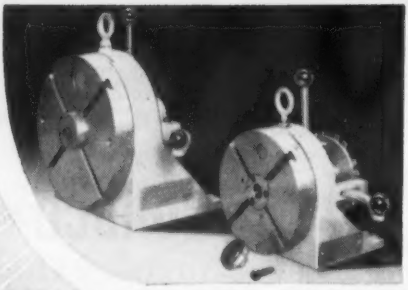
- **Engraves**
- **Profiles**
- **Die Cuts**
- **Mills**

A sturdy, production tool for 2-dimensional cutting in steel, cast iron, non-ferrous metals and plastics.

Pantograph reductions from 1:1 to 1:40. Spindle speeds infinitely variable from 1,200 to 11,500 RPM without belt changing.

Extreme accuracy and freedom of motion. Write for "Panto-Miller" details.

JOHNSON & BASSETT, INC. *Production Tool Div.*
BOX 1251, WORCESTER, MASSACHUSETTS, U. S. A.



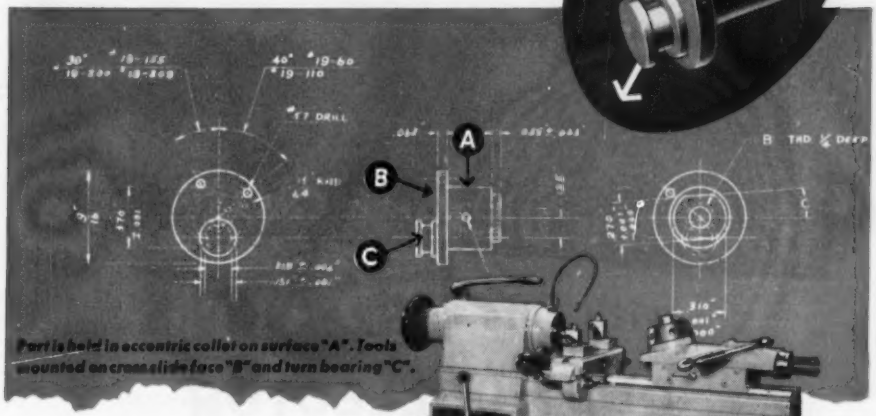
2. RAPID, ACCURATE JIG POSITIONING

This indexing trunnion, with station selector, accurately holds and locates either jig or work. SIMPLIFIES JIGS. REDUCES SET-UP TIME.

Ask for "TRUNNION" information

INSTANT START-STOP

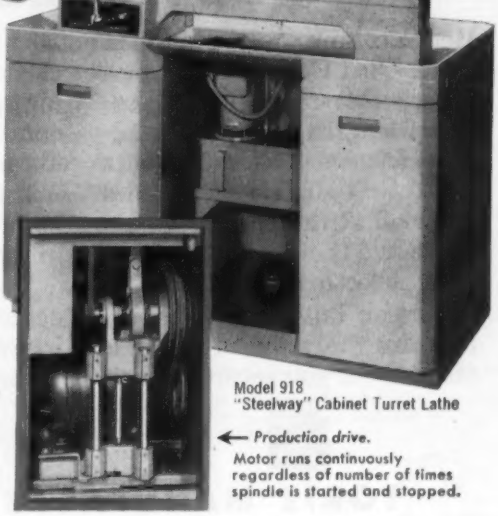
boosts Penn Fishing Tackle parts to 250 per hour!



Penn Fishing Tackle Mfg. Co. went fishing to catch ideas for stepping up production of eccentric parts. The Rivett 918 "Steelway" Cabinet Turret Lathe with its production drive proved ideal for their needs.

This production drive features "split-second" starting and stopping of the spindle by movement of the lever chuck closer handle. With one forward pull, the operator closes collet on work, releases brake and engages spindle drive. When lever is pushed back, spindle drive is disengaged, brake mechanism is applied and work is released.

A 918 "Steelway" can boost your production, too! Why not go fishing and see what savings can be caught!

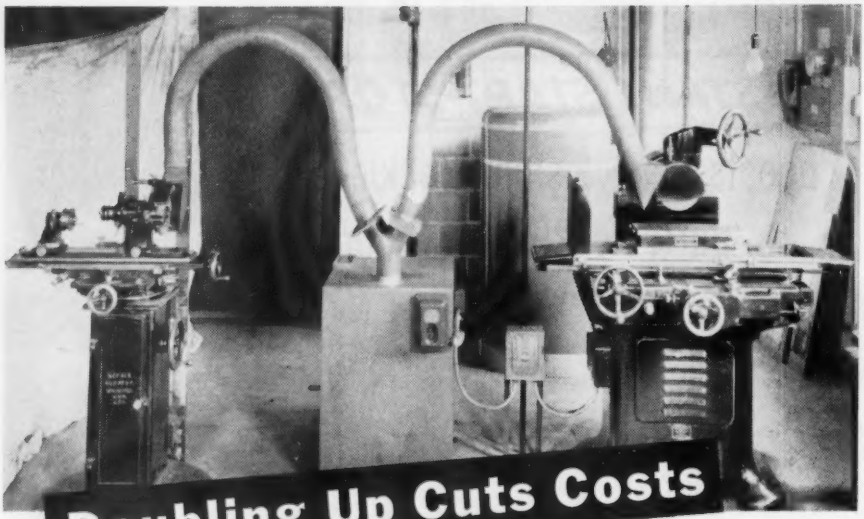


Model 918
"Steelway" Cabinet Turret Lathe

← *Production drive.*
Motor runs continuously regardless of number of times spindle is started and stopped.

RIVETT

LATHE & GRINDER, Inc.
Dept. MMR7, Brighton 35, Boston, Mass.



Doubling Up Cuts Costs

with this TORIT DUST COLLECTOR

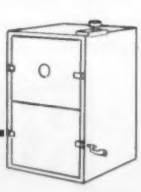
Here a compact, self-contained Torit Dust Collector occupies otherwise unusable space. Short lengths of piping minimize friction losses. Cut-outs control air suction. Unit goes on or off at the push of a button. Here is efficient, low cost dust collecting.

Unseen but equally important are the years of dependable service you get from Torit Dust Collectors. The complete cleaning and recirculation of air maintains good working conditions, protects against abrasive dust damage and, in many operations, permits salvage of diamond wheel and other valuable dusts.

Torit Dust Collectors are economical to purchase, to install, to operate and to maintain.

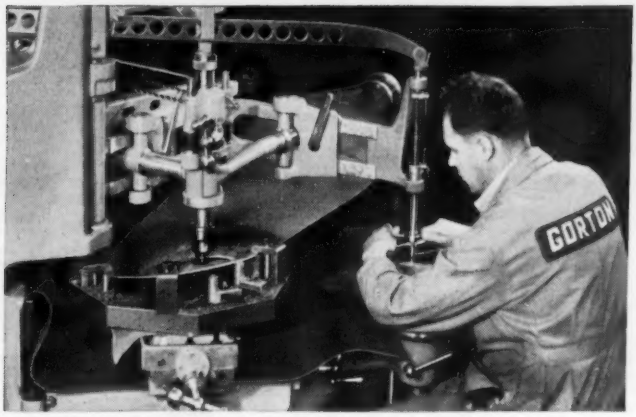
see our catalog in MACHINE TOOL CATALOGS

For the answer to your dust problems write:



TORIT MANUFACTURING CO.

296 WALNUT STREET • ST. PAUL 2, MINNESOTA



Gorton Pantograph Does Job 7 Times Faster

In only 40 minutes this tracer-controlled pantograph cuts and blends a thermal slot in an 8-foot steel propeller blade — a job that requires 5 hours 10 minutes by other methods. This is typical Pantograph performance—one of hundreds of examples.

Gorton *Pantography*

Brings Creative Production to Your Plant

What's *your* problem in machining? Depend on Gorton Pantography to help you *create* a new production method if your problem falls into any of these categories:

OPERATIONS

Inside profiling	Mold cutting	Grooving
Outside profiling	Counterboring	Graduating
Routing	Contour Milling	Engraving
Die sinking	Chamfering	

Gorton Pantography works in two or three dimensions, in all directions, horizontally *and* vertically on ferrous or non-ferrous metals or in plastics. Easily made, inexpensive enlarged masters are employed and work is done at a reduction ratio which increases accuracy — an exclusive pantograph benefit.

Whether a dozen or a thousand pieces, each is identical in shape and tolerances to the first. Operation during cutting cycle is manual or automatic, and work piece size varies from the diameter of a dime to areas as large as ten feet.

Clip the coupon for your copies of the Gorton catalog and the helpful booklet, "Pantography."

GEORGE GORTON MACHINE CO.

1707 Racine St., Racine, Wis., U.S.A.

Please send at once complete information about the Gorton line contained in Bulletin 1655-1707.

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A 7787-1P-A

measuring up

...and REX is the standard

by which all high speed steels are compared

An older brother sometimes makes a handy yardstick for measuring junior's growth. And when it comes to tool steels, REX® High Speed Steel is — and has been for over 50 years — the standard of comparison.

There's no mystery to REX High Speed Steel. Its quality has been time-tested in thousands of shops. And after all, it's performance — not claims — that really counts. Make your *own* comparison test. Put REX High Speed Steel to work. Compare its structure, finish, hardenability, carbide distribution and general uniformity. You won't find another high speed steel that surpasses REX.

Remember, too, that even though it is widely distributed and used, REX High Speed Steel is made *only* by Crucible. So for tops in high speed steel performance, be sure you order the Crucible REX brand.

CRUCIBLE first name in special purpose steels

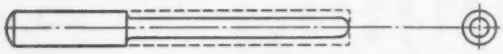
54 years of Fine steelmaking

TOOL STEELS

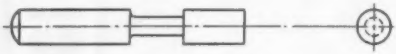
CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

Swaging Success Stories

Close Tolerances... without Machining

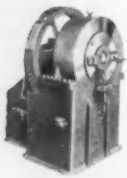


This finished piece used to be made on an automatic screw machine with the long, narrow diameter section turned to .100 ±.003 and a necessary sharp shoulder.



Torrington's swaging experts suggested starting with this simple screw machine blank (to retain the required shoulder).

Result after one rotary swage—an improved finished piece, to a tolerance of ±.001.



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Swager Department
730 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

Why not write for our informative booklet on swaging that includes complete descriptions of Torrington Rotary Swagers. It may show you how you can achieve a "swaging success story" in your own plant.

See what savings you can make by swaging

1. Saving in material—swaging uses nearly all the metal.

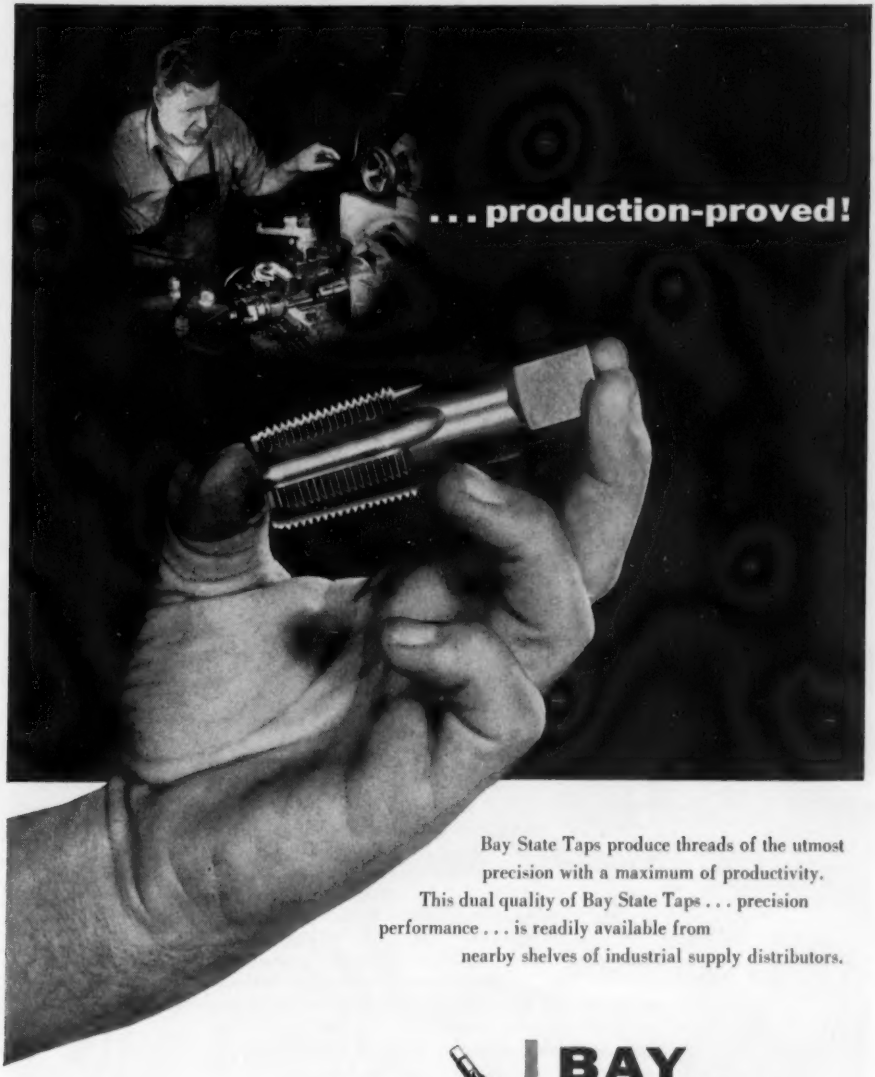
2. Saving in time—swaging is fast.

3. Saving in labor—unskilled labor can run a swager.

4. Saving in machining—swaging produces finishes accurate to ±.001.

5. Saving in finishing operations—swaging produces high finish, better hardness and resiliency.

TORRINGTON ROTARY SWAGING MACHINES



Bay State Taps produce threads of the utmost precision with a maximum of productivity. This dual quality of Bay State Taps . . . precision performance . . . is readily available from nearby shelves of industrial supply distributors.

BAY STATE TAPS

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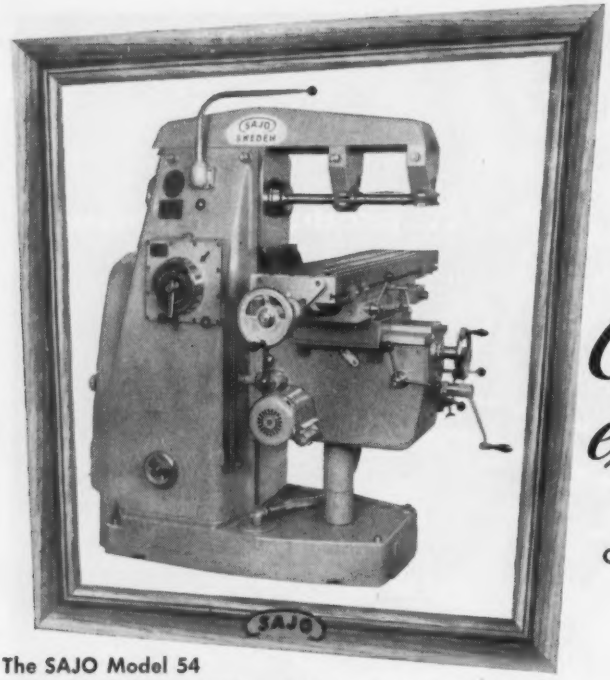


Classic example

OF SWEDISH CRAFTSMANSHIP

The SAJO Model 54
No. 2 ALL-GEARED Milling, Machine Plain or Universal

is an outstanding example of Swedish craftsmanship and fine quality materials, combined in a modern design.

Capable of continuous dependable service under the most severe conditions and guaranteeing maintenance of accuracy to tenths, the SAJO Model 54 Millers meet all requirements for:

POWER . . . . . 7½ HP motor drive to spindle (5 HP optional).
1½ HP table feed and rapid traverse motor.

RANGE . . . . . 16 spindle speeds 39-1500 RPM (optional 31-1200 RPM).
12 table feeds 11/16" to 25"/min. longitudinal and cross.
11/32" to 12½"/min. vertical.
Power rapid traverse 96"/min. longitudinal and cross. 48"/min. vertical.
Table travel longitudinal 33½". Cross 10". Vertical 18".

ACCURACY . . . . Handscraped sliding surfaces, Spindle (#50 NMT taper) mounted in four precision SKF bearings ensuring constant smooth operation and fine finish.

SIMPLICITY . . . . . Single adjustable START-STOP-BRAKE lever, Dial selection of speeds and feeds.

Priced well below levels of comparable top grade millers.

Prompt delivery. Full selection of accessories available.

Also available: SAJO No. 2 Light Duty Plain or Universal Millers.

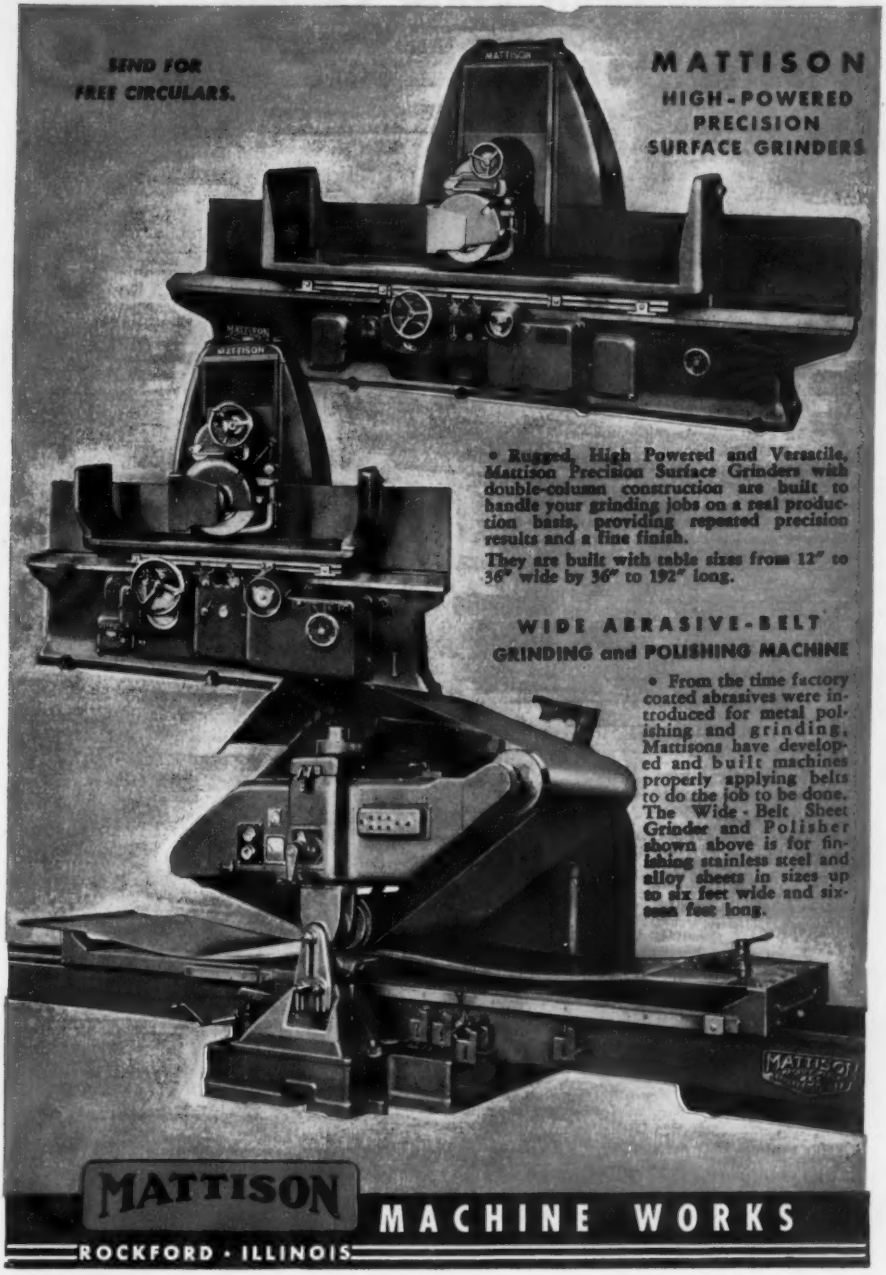
For information write to:

austin industrial corp.

76-H MAMARONECK AVE., WHITE PLAINS, N.Y.

Look for the Austin Seal—your full guarantee of satisfaction.

Dealers in principal cities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HIGH-POWERED
PRECISION
SURFACE GRINDERS
• Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.
They are built with table sizes from 12" to 36" wide by 36" to 192" long.
WIDE ABRASIVE-BELT
GRINDING and POLISHING MACHINE
• From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.
MATTISON
MACHINE WORKS
ROCKFORD • ILLINOIS

NOPAK Shelf-Stock Service — *based on these 2 Standard Mounting, Class 1, Cushioned Cylinders*

MODEL A

MODEL E

Now in its 6th year

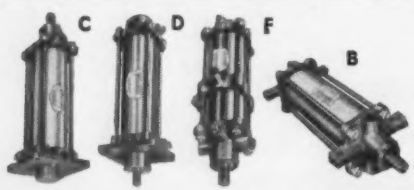
LIST PRICES F.O.B. Milwaukee, Wisconsin

STOCK STROKE LENGTHS — Double Acting Cylinders									
Cyl. Dia. Bore	1"	2"	3"	4"	6"	8"	10"	12"	15"
1½"	24.16	25.72	26.08	26.44	27.16	27.88	28.60	29.32	30.40
2"	26.24	27.88	28.32	28.76	29.64	30.52	31.40	32.28	33.60
2½"	32.36	34.12	34.68	35.24	36.36	37.48	38.60	39.72	41.40
3"	35.04	37.28	37.92	38.56	39.84	41.12	42.40	43.68	45.60
4"	40.84	43.68	44.52	45.36	47.04	48.72	50.40	52.08	54.60
4½"	48.96	51.92	52.88	53.84	55.76	57.68	59.60	61.52	64.40
6"	66.60	70.80	72.20	73.60	76.40	79.20	82.00	84.80	89.00
8"	.....	126.80	129.20	131.60	136.40	141.20	146.00	150.80	158.00

By specifying NOPAK Shelf-stock, you buy quality cylinders at the lowest possible prices, you eliminate waiting for "specials", reduce engineering costs. Compare the prices and scope of NOPAK Shelf-stock (1½ x 1" to 8 to 15") with competitive offerings — and you will specify NOPAK.

- Basic mountings "A" or "E" convertible to "B", "C", "D" or "F", (see below) by changing cylinder heads. Add 10% to above prices, (no extra charge 8" bore).
- Piston Rods NF male thread.
- Cushioning can be eliminated on rod, blank or both ends by removing spring and ball-check.

NOPAK 4-Way Valves, hand, foot, solenoid, or pilot operated, to activate all cylinders, also in Shelf-stock.



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VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

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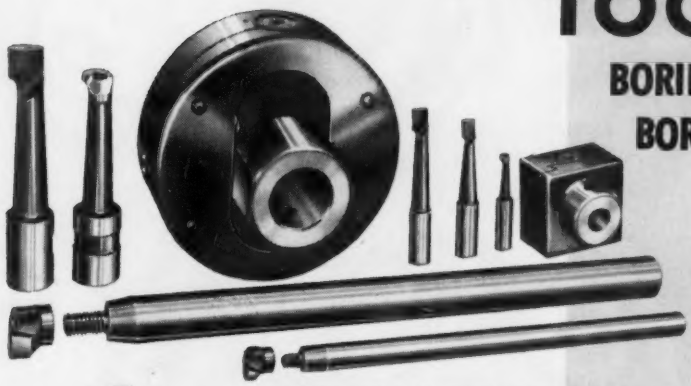
A 8003-½-IA

for more *Accurate* cuts...
greater *Rigidity* in

BORING TOOLS

BORING HEADS
BORING BARS



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BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ⅜ to 1¾ inches diameter. Bore holes from ⅛ to 20 inch diameter.

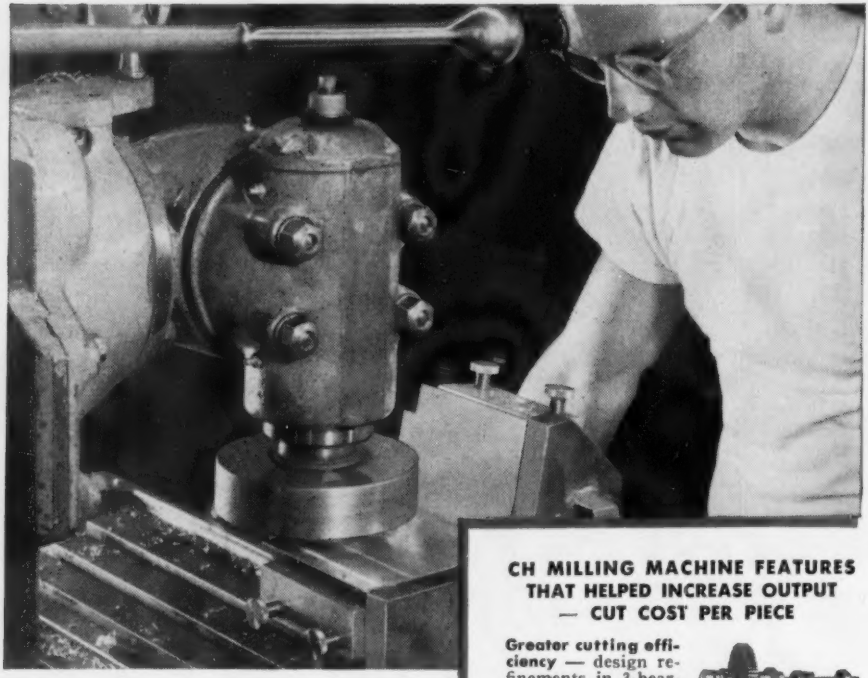
Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.
See the complete line of CRITERION TOOL PRODUCTS at your local dealers or write for free catalog.

CRITERION
MACHINE WORKS
9312 SANTA MONICA BLVD • BEVERLY HILLS, CALIF.

5 MINUTES PER PIECE WITH THIS VERSATILE NEW CH MILLING MACHINE



Speeds fabrication of aircraft parts from 75ST aluminum alloy

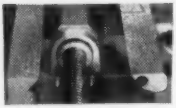
HERE ARE THE FACTS ON THIS JOB:

Location: - Mar Vista Engineering Co., Los Angeles, Calif.
Machine: - 5 hp, No. 2, Model CH, Plain Style used with Universal Milling Attachment.
Part: - - Aircraft fitting for horizontal stabilizer.
Material: - - - - 75ST aluminum alloy.
Cutter: - - - - One blade — 8" fly cutter.
Cutter Speed: - - - - 875 rpm. 9 ipm feed.
Depth of Cut: - - - - - - - .050".
Production: - 12 pieces per hour — all sides milled.

Investigate the versatile new CH line of milling machines. Their features are job proven to give you cost-cutting results plus greater productivity, better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wis.

CH MILLING MACHINE FEATURES THAT HELPED INCREASE OUTPUT — CUT COST PER PIECE

Greater cutting efficiency — design refinements in 3-bearing spindle, a heavy duty, special forged steel gear.

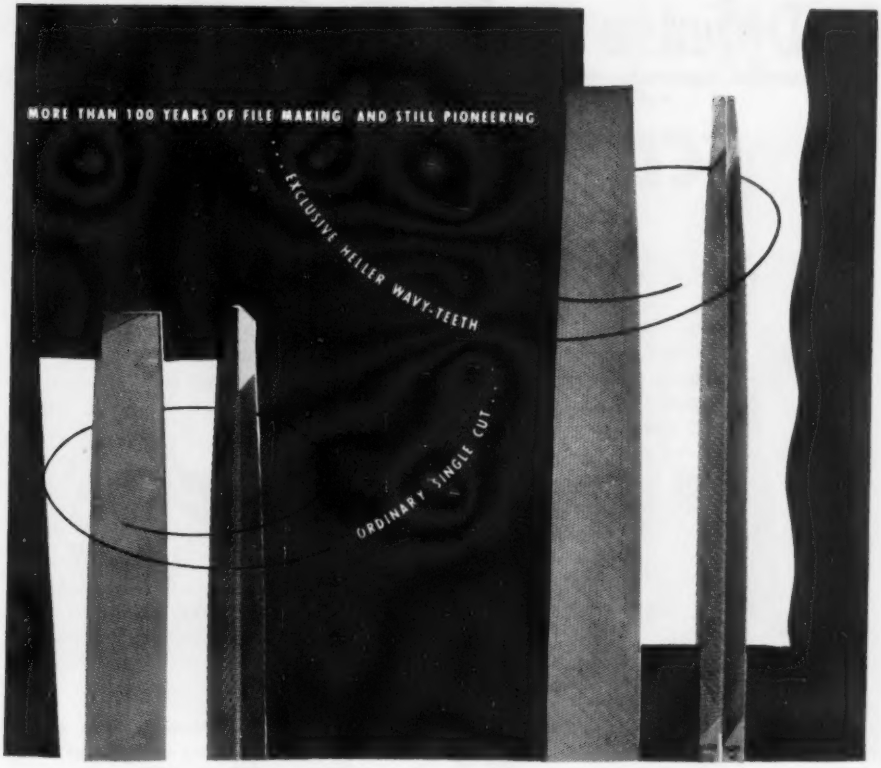


Smoother feed performance, heavy duty 2" dia. table feed screw. *23%* more bearing contact between screw nut.

Speed range — *16* changes from *25* to *1500* rpm. *Extra-wide feed range*— *16* changes from ¼ to *32* ipm.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

NOTE: This machine available under Kearney & Trecker's Tool-Lease Program.



HELLER WAS *FIRST* WITH WAVY-TEETH MILL AND SAW FILES

You can remove more metal faster when you use Wavy-Teeth mill or saw files instead of ordinary single cut mill or saw files. Always specify "Wavy-Teeth" to get this exclusive Heller tooth arrangement . . . a typical development of Heller research. Through a continuous program of inspecting, testing and improving, Heller guarantees file users "the best."

other Heller *Firsts*

SPIRAL-CUT Half Round Files
NUCUT Wavy-Teeth Files
VIXEN Milled Curved Tooth Files

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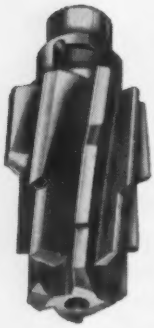
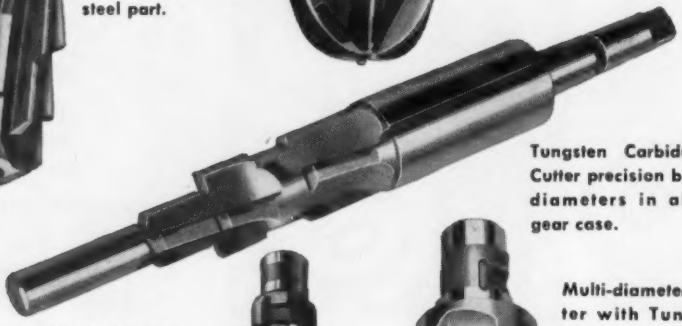
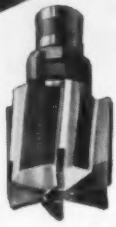


Eclipse Radial Drive High Speed Steel Cutter bores 5 diameters in steel part.

Special Cutter forms ball seat in road building machinery unit.



Tungsten Carbide Tipped Cutter precision bores three diameters in aluminum gear case.



Radial Drive Tungsten Carbide Tipped Cutter bores gear pocket in oil pump.

Multi-diameter cutter with Tungsten Carbide Tipped inserted blades for boring, counterboring and chamfering.

Since 1913—through two wars and during the peace years—Eclipse has met the exacting and changing demands of industry for special purpose end cutting tools. What better test? What better recommendation? Our large modern plant can serve you, too. Send your problem to us, today!

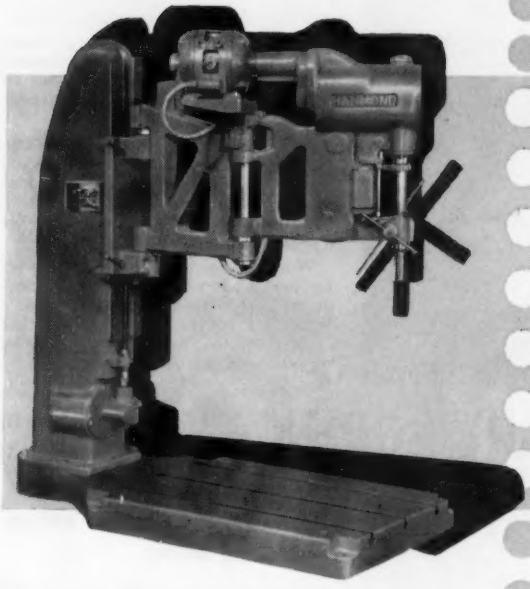
ECLIPSE COUNTERBORE CO.

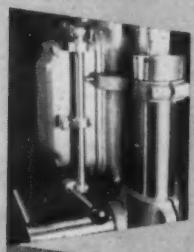
Founded in 1913

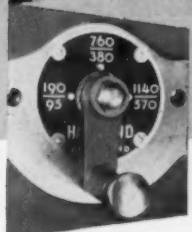
DETROIT 20, MICHIGAN

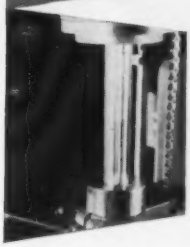
FOOTBURT

for faster radial drilling and tapping









Hammond Radial Drilling and Tapping Machines may be spotted in the production line for drilling, tapping or reaming. With its unique Bracket Type construction the spindle can be swung quickly from hole to hole. Six Quick Speed Changes are instantly available and the Hammond Tapping Reverse is very fast and convenient to operate.

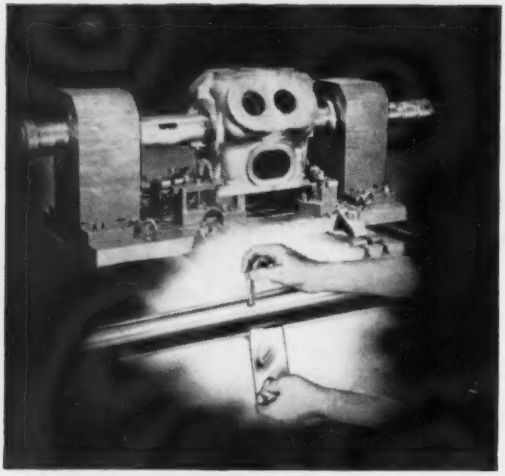
THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building

engineered for production

FOOTBURT

MACHINE TOOLS

ROUTINE BORING: If there's a better way to do it, DAVIS will know it!



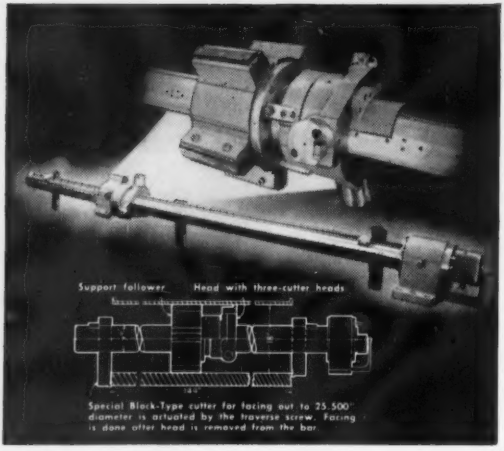
Here's how DAVIS tools help improve everyday jobs

Davis Block-Type cutters simplify ordinary float boring and reaming. Here, you see Davis Block-Type cutter, mounted in a Davis line bar, being used to bore the crank bores in an air conditioning housing.

Davis Block-Type cutters are exceptionally easy to insert or remove from the bar. Mere insertion or removal of the pin does the job. Without changing bar or setup, cutters can be changed for a sequence of operations.

When you reduce the time required for jobs performed every day, it adds up to important savings over a year's time. It's tooling aids like this that have proved the word, "If theres a better way to do it, DAVIS will know it."

EXTRAORDINARY BORING: If DAVIS can't bore it, it can't be done!


Support follower
Head with three-cutter heads
Special Block-Type cutter for facing out to 25.500" diameter is actuated by the traverse screw. Facing is done after head is removed from the bar.

Traveling and feedout boring heads and blocks

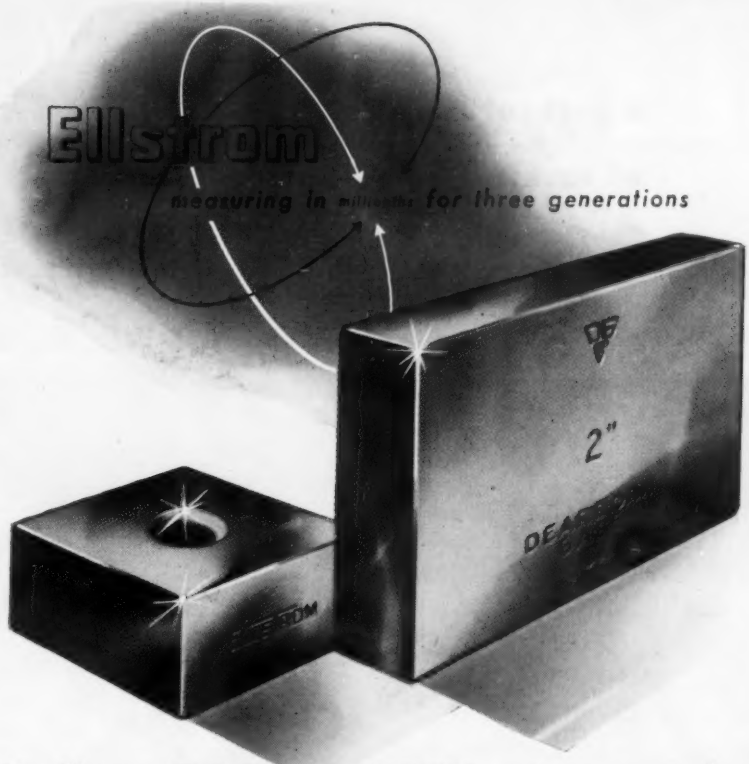
Here's a special Davis three-cutter traveling boring head used to bore, face and chamfer. Mounted on a bar in a lathe, it is fed through the work by means of a traverse screw connected to the head. The support follower head, which assures a straight bored hole, slides through the bore while the bar rotates on needle bearings. Cross slide blocks face the two ends of the workpiece . . . are also used to cut phonographic grooves at the end.

The lathe spindle drives the bar, and work is supported in a special fixture. Gear box provides feed and rapid traverse in inches per revolution. Feed rates can be varied by changing gears.

What's your boring problem?

Davis makes a complete line of interchangeable block-type cutters, boring heads, boring bars, super-micrometer fly-cutter tools, L-type micrometer boring tools, special boring tools and accessories. Offers you a complete tooling service to solve any routine or extraordinary boring problems. Get the facts now. Write for the new Davis Catalog 304.

DAVIS
BORING TOOL DIVISION
of Giddings & Lewis Machine Tool Co.
FOND DU LAC WISCONSIN



No finer GAGE BLOCKS at any price!

By any comparison you care to make . . . block-for-block, set for set . . . you'll find Ellstrom Chromium Plated Standards truly outstanding in the field of precision measurement. They are precisely treated and thoroughly tested for coefficient of expansion, uniform hardness, and metallurgical stability. The durable chromium plated gaging surfaces are applied and finished by special Ellstrom methods which assure you of greater serviceability, longer wearing millionths. And flatness, parallelism, and specified accuracy of each individual block is fully certified by the most uncompromising final inspection found anywhere in the industry.

So next time you need gage blocks, specify Ellstrom Standards. Furnished in 28 basic sets, either square or rectangular styles, with block sizes in step series from .010" up to and including 20.000". Basic accessories also available . . . plus tungsten carbide wear blocks and individual blocks. New Ellstrom Standards Catalog contains complete specifications and prices . . . send for your copy today.

ELLSTROM STANDARDS DIVISION

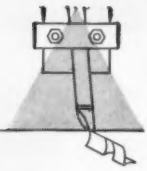
Dearborn Gage Company • 22035 Beech Street • Dearborn, Michigan

Originators of Chromium Plated Gage Blocks

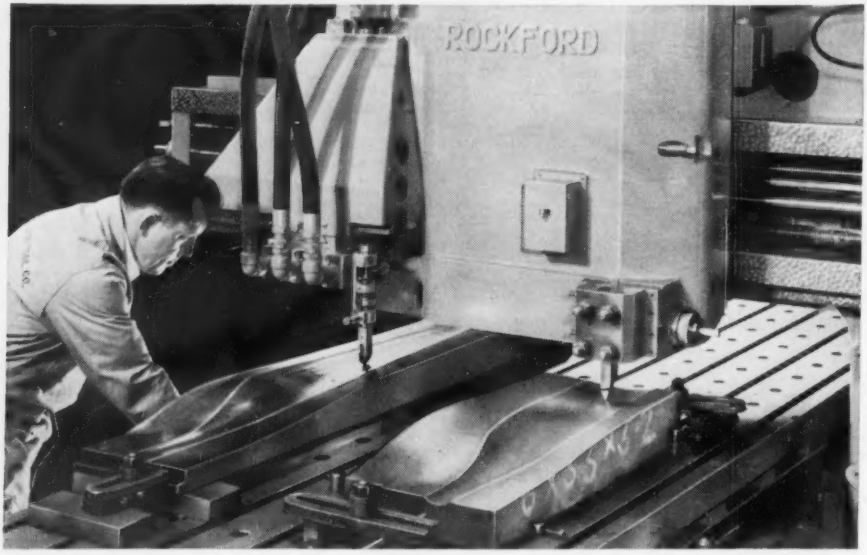
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES AND CANADA

a cost cut . . . with every stroke

of rockford kopy-kat hydraulic



duplicators



higher production is obtained with every stroke **because...**

the unique Kopy Kat duplicates automatically. It's hydraulic duplicator valve is so sensitive, so exact, that positive duplication of complex forms is done with the ease of straight-production machining.

Ask us for recommendations for your duplicating shaping, planing, slotting and turning work.

OUR 52nd YEAR

ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET · ROCKFORD, ILLINOIS

"doing a job" at Avey*

STANDARD
TWIN WHEEL TOOL GRINDERS

* Here's what the plant manager at Avey Drilling Machine Co., Cincinnati, has to say about Standard's Twin Wheel Tool Grinder:

"Any grinder that stands the punishment that we give it here at Avey must be a good grinder. All day long, day after day, we grind Carbide tipped lathe tools including boring, cut-off forming, and other high-speed steel tools. Maintenance has been only routine. Down time . . . none. Its economy is amazing."

Why not install a Standard Twin Wheel grinder in your plant? Available in 10" and 14" wheel sizes, wet or dry. No spray or splash when wet grinding. Two operators can grind at once. Conserves floor space. Write for Bulletin TW.

Avey reports these results:

- increased production
- 30% decreased grinding time
- grinding costs way down
- less operator fatigue
- much longer wheel life

one step from rough to finish grind

Patent Pending

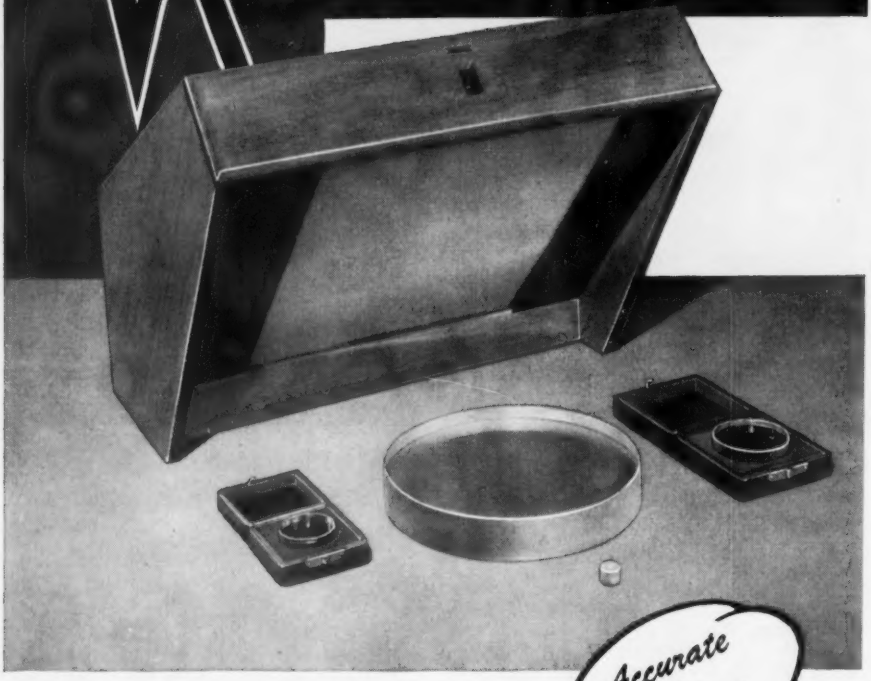
standardize with . . .

the STANDARD electrical tool co.

2487 RIVER RD. • CINCINNATI 4 • OHIO

fused quartz

VK OPTICAL FLATS



Accurate to .000001"

With VK Optical Flats, close checking of flat surfaces is simplified and more conveniently handled.

Shown here is the new Van Keuren monochromatic light, 22¼" wide, 17¼" high and 20" deep (in bench space). It is designed for use with large optical flats such as the one shown—a 10" diameter fused quartz double-surface master flat (accurate to .000001" both sides).

VK Optical Flats are available in sizes from ½" diameter to 10" diameter in .000001", .000002" or .000004" accuracy. They can be shipped within 30 days from order.

Catalog and Handbook No. 35 is available by writing: The Van Keuren Co., 175 Waltham St., Watertown, Mass. Ask for your copy.

VK

35th YEAR

THE Van Keuren CO.,

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

Another COVEL 80th Anniversary Presentation

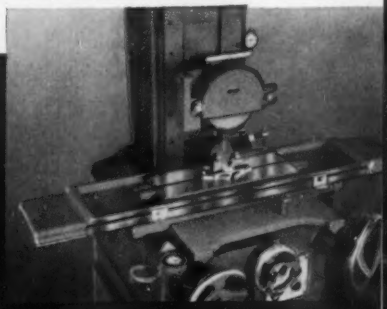
The New COVEL NO. 10

LOW COST POWER AND HAND FEED SURFACE GRINDER

All-new 6" x 8" Surface Grinder for low cost precision gage, form tool work and surface grinding. Grinds 6" x 18" x 15" under 7" dia. wheel. Table speed, 10 to 50 FPM., longitudinal table travel, 20". Table driven by special timing belt eliminating rack and gear. Adjustable automatic cross feed .002 to .050 at *end* of each table stroke. Any 1 H.P., 3600 RPM direct motor driven spindle can be adapted. Hand scraped ways, dust proof motor control enclosure, one shot lubrication system, heavy, rugged construction.

Send for Bulletin M-74

Set-up for grinding snap gage using indicators and rods



80 YEARS of continuous manufacturing experience makes your COVEL choice a sound one

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

Here's a NEW design feature in Vertical Mills!

VERTICALLY ADJUSTED HEAD GIVES GREATER RIGIDITY AND ACCURACY

Here are the facts . . .

Unlike knee-type mills, the head of the IMPCo Model 1-B Vertical Milling Machine is vertically adjusted by a counter-balanced ram. The table and controls do NOT move vertically. The exclusive ram design has greater rigidity. Its larger scraped bearing surface area gives more accuracy for both production and tool room milling.

Massive Design for *Versatility* and *Precision*

The IMPCo Model 1-B is heavy for a No. 1 Mill. It weighs approximately 3,100 lbs. Spindle quill diameter is 3½". Uses *standard* 1 HP motor.

Get all the facts.
Write for Bulletin MM-102.

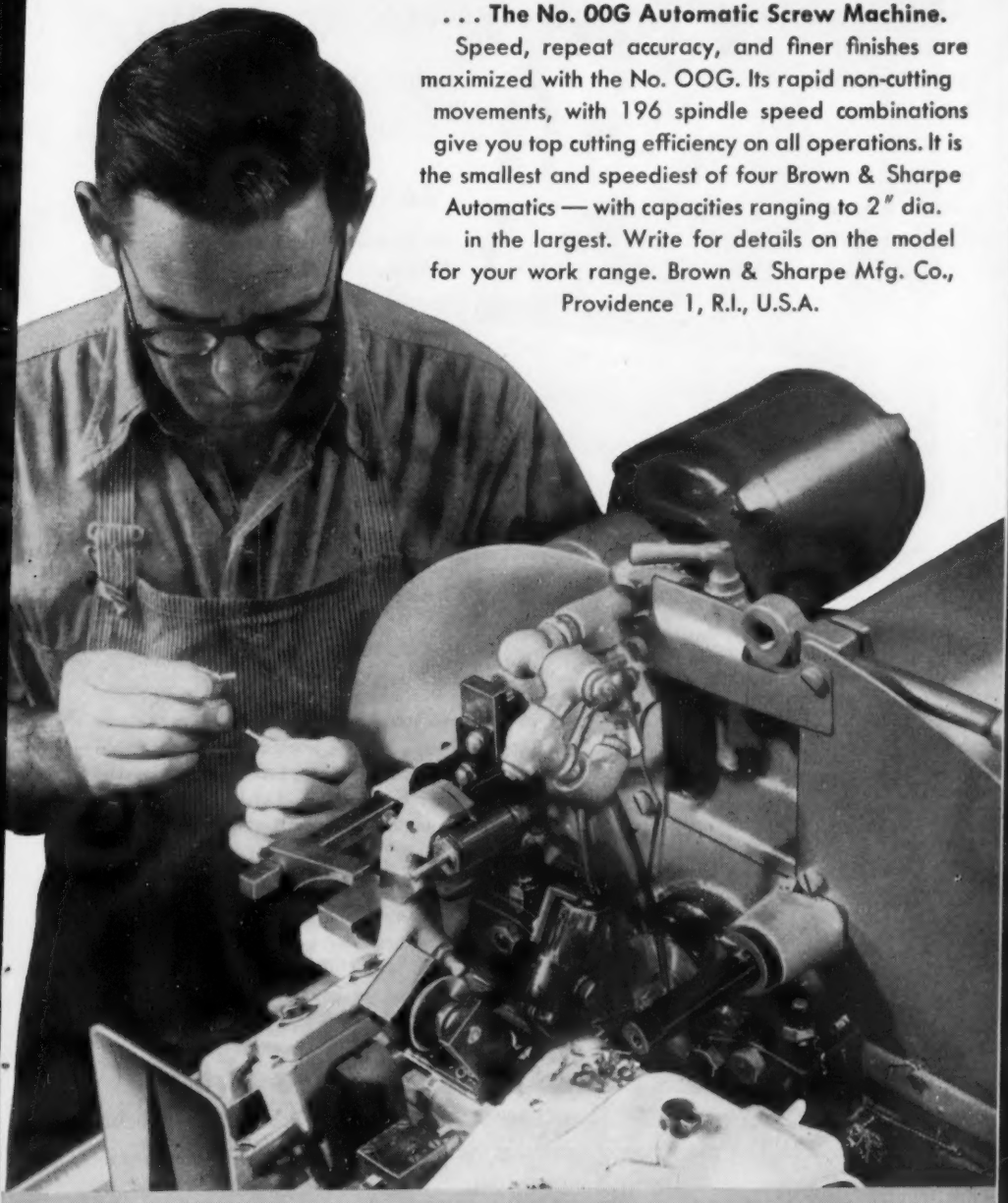
IMPCO

INDUSTRIAL METAL PRODUCTS CORPORATION

Builders of IMPCo Straighteners, the American HEB Pilot Lathe, and Special Machinery

3412. W. ST. JOSEPH STREET LANSING, MICHIGAN

A "Hot Number" on Cold Steel . . .



. . . The No. 00G Automatic Screw Machine.

Speed, repeat accuracy, and finer finishes are maximized with the No. OOG. Its rapid non-cutting movements, with 196 spindle speed combinations give you top cutting efficiency on all operations. It is the smallest and speediest of four Brown & Sharpe Automatics — with capacities ranging to 2″ dia. in the largest. Write for details on the model for your work range. Brown & Sharpe Mfg. Co., Providence 1, R.I., U.S.A.

Brown & Sharpe B·S

JIG GRINDING ACCURACY *guaranteed**

*Dependably accurate to "tenths"

EASILY CONNECT

this jig grinder to jig borer or mill (The "Vulcanaire" has infinite controlled speeds 30,000 to 65,000 R. P. M.)

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs. *Dependably accurate to "tenths"

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Vulcanaire

It's built by toolmakers for toolmakers

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3⅛" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

MAJOR VULCAN SERVICES

Engineering, Processing, Designing and Building, Special Tools, Dies, Special Machines including the Vulcan Hydraulics that Form, Pierce, Assemble and Size.

VULCAN TOOL CO. • PRITZ AND HIGHLAND • DAYTON 10, OHIO

for machining, grinding and presswork

A UNIVERSAL COOLANT-LUBRICANT

TOOL LIFE BOOSTED 60 to 80% WITH SHEAR-SPEED SOLUBLE OIL!

machine down-time cut in the production of gears for a large auto manufacturer.

IMPARTIAL TESTS of two highly-rated cutting fluids vs. SHEAR-SPEED Soluble Oil were run under *exactly similar production conditions:* ***same machine, same parts, same cutting speed, same coolant flow, same tool grinding***

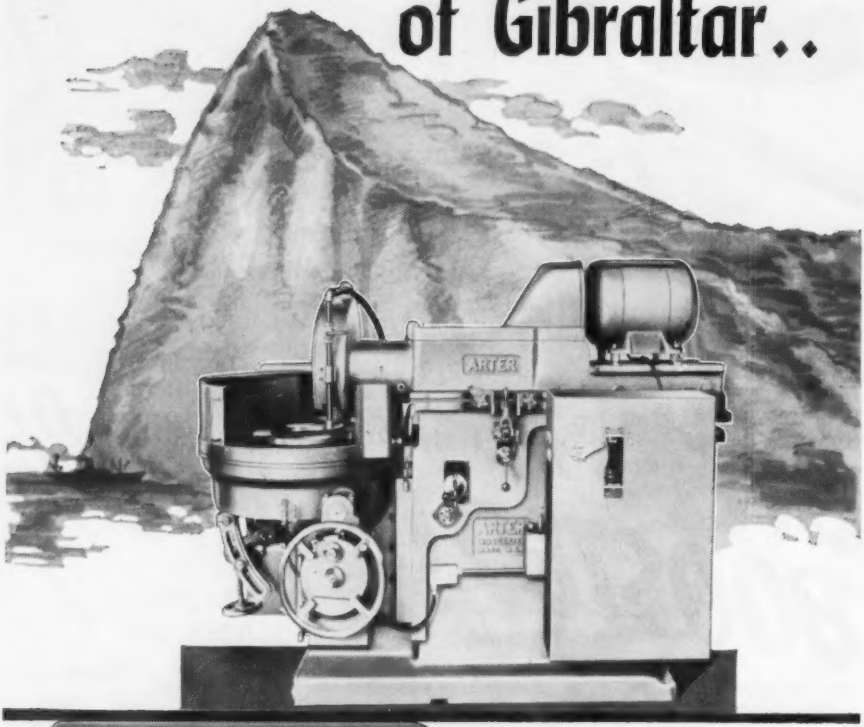
	Cutting Fluid X	Cutting Fluid Y	SHEAR-SPEED Soluble Oil	S/S Soluble Oil Gave This:
Average No. gears cut per grind	177.6	193	228	More pieces per grind
Tool stock removed per grind	.0227"	.0288"	.0188"	Less tool wear
No. of grinds per .375" hob wear	16	13	20	Longer tool life
Average tool life	2842 parts	2509 parts	4560 parts	Lower tool cost per piece

Convince yourself of the **amazing** advantages and versatility of SHEAR-SPEED Soluble Oil in your own plant. Sold only on a **satisfaction guaranteed** test basis. Write for **Bulletin SO-53** and price list.

SHEAR-SPEED CHEMICAL PRODUCTS

7175 E. McNICHOLS RD. *A Division of Michigan Tool Co.* DETROIT 12, MICH.

Like the Rock of Gibraltar..



ARTER **Rugged Dependability**

This trademark on your grinder means rugged dependability has been built in. For precision down to the last tenth, you will find ARTER always reliable. ARTER engineers have solved hundreds of trying grinding problems. They can solve yours.

ARTER GRINDING MACHINE COMPANY
WORCESTER 5, MASSACHUSETTS

Rotary Surface Grinders, Cylindrical Grinders, Flat Circular Cutter Grinders, Internal Grinders, Carbide Tool Cutters

Agents in industrial centers of United States and Canada

TRADE MARK
"FULFLO"
REG. U.S. PAT. OFF.

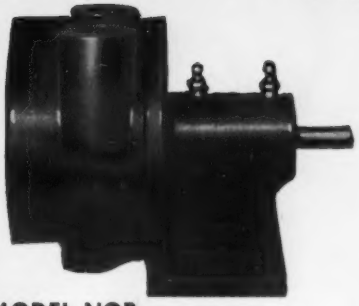
CENTRIFUGAL
COOLANT PUMPS

FULFLO PUMPS PAY FOR THEMSELVES IN PROLONGING TOOL EFFICIENCY

• First rule for any tool . . . KEEP IT COOL . . . so destructive friction and overheating can't hasten obsolescence adn add to costs by too-frequent overhaul or replacement.

A good rule, too, is to let FULFLO COOLANT PUMPS pump and circulate your coolants right to the right spot.

Direct, motor or belt driven. Vertical or horizontal installations. Capacities from ¼ hp to 1 hp; pipe sizes from ⅜" to 1½".



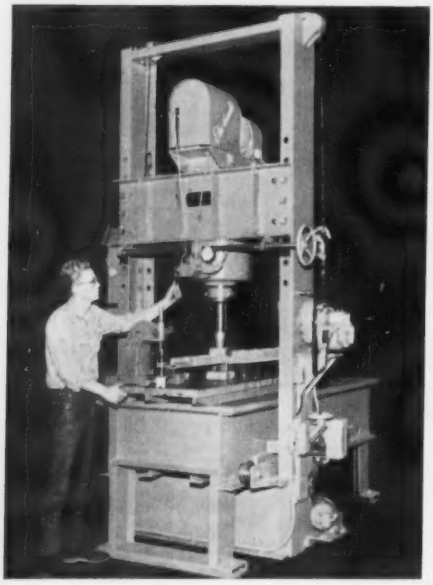
MODEL NOR
Right rotation
MODEL NOL
Left rotation
Direct connection 1600 to 2600 rpm;
8 gallons per minute at 1725 rpm.

WRITE FOR PERSONAL COPY—on your letterhead—of FULFLO MECHANICAL DATA BOOK. Please state if for Pumps, for Valves or for both.

TRADE MARK
FULFLO
REG. U.S. PAT. OFF.

THE FULFLO SPECIALTIES CO. Inc.
PUMP AND VALVE MANUFACTURERS
BLANCHESTER, OHIO

When the mountain wouldn't come to Mohammed



Tradition says that the mountain didn't come when Mohammed commanded, so he resolved the situation by going to the mountain.

The same strategy makes the Dake Movable Frame Press unique among presses. Instead of moving the work under the press, the press is moved over the work. The frame moves longitudinally and the work-head moves laterally or vertically to any position over the worktable.

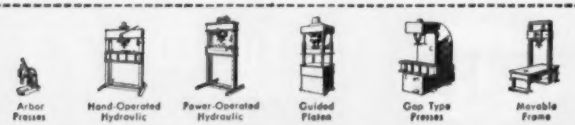
The advantages of this arrangement are many. For example, at left a Dake Movable Frame Press is used for straightening aircraft forgings. Once the forging is mounted on supports, and gauges have been placed, pressure can be applied at any desired point without disturbing the setup.

Support points can be spread to the extreme edges of the large table for work on long or irregularly shaped pieces. Work too heavy or awkward to handle manually, can be set on the table with an overhead crane, and the press moved into position.

Dake movable frame hydraulic presses can be electric or air powered, and are availble in 25- to 300-ton capacities. Write for Bulletin No. 269.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich.

DAKE PRESSES



It MUST have been good!

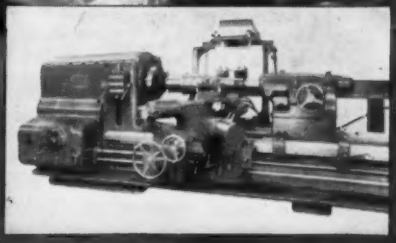
There are times when expressions speak louder than words.

Here's a group of distinguished steel mill roll executives watching a demonstration on a 26" Capacity "AMERICAN" Hydraulic Roll Lathe—judge for yourself whether or not they are satisfied with what they saw.

These machines are performing "miracles" in savings in many of the best known roll shops in the country. They have introduced a brand new machining technique that has revolutionized the art of roll turning. They reproduce work shapes from a template faithfully and accurately not only on steel mill roll bodies and necks, but on such work as spindles, motor shafts, valve stems, step shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

Evidence from hundreds of installations proves beyond a shadow of a doubt their leadership as top-flight cost reducers. Was there ever a time when cost reduction was more urgently needed?

If it's proof you want just drop us a line—no obligation.



THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

over the editor's desk

More Than a Look

WE wish it were possible somehow to explain the look of exaltation we have noticed on the face of the man who, while taking us on a tour of his department or through his plant, points to a new tool or perhaps a new machine which was recently purchased and installed in the shop. We can explain, however, that the expression on his face is the exact opposite of the expression we have noticed as he looks in the direction of an obsolete piece of equipment which, as in a very apologetic way he explains, "one of these days we're going to get rid of that old clunker and replace it with a new 'Model X' machine that recently was placed on the market and which I understand can do the job much faster and better."

The point we would like to make is that new and modern equipment in the shop does make a difference, even down to the way it makes a man look . . . and feel toward the work in which he is engaged.

Of course, the reasons why a manufacturer spends hard earned money for new equipment to modernize his manufacturing setup go far beyond a desire to change facial expressions. Today, most manufacturers are confronted with the keenest competition they have ever known. Those who attempt to get by with using obsolete methods and equipment to manufacture their products are going to lose whatever advantage they may have had over competitors who are more alert and aggressive.

We need only call attention to the present struggle for sales leadership in which the large automobile manufacturers find themselves. In 1946, Ford initiated a study of production costs, which resulted in a widespread methods improvement and equipment modernization program. We think it is safe to say that the gains made in Ford's sales today can be attributed largely to the less costly processes of manufacturing parts that have been brought into use. Countless other manufacturers have also discovered that they just can't afford to relax in their efforts to keep their facilities equipped with the most up-to-date tools and machines.

MODERN MACHINE SHOP takes pride in the part it is able to play in calling attention to the newest methods, tools and equipment which are so important a part of any modernization plan. This month particularly it is gratifying to present an issue devoted entirely to dynamic, idea-loaded articles for those who seek to obtain more production through modernization. These are articles that command attention and call for action. And the time to take action is now.

Hanna
AIR AND HYDRAULIC
Cylinders
AND
Valves

Here's Power and Control . . . for 101 uses

YOU CAN SPEED PRODUCTION, cut costs and simplify the actuation and control of many of your machines and equipment by using the fast, smooth *power of Hanna Cylinders* with the *exacting control of Hanna Valves.*

Hanna Cylinders are available in low pressure models operated by air, oil or water up to 110 p.s.i. and in high pressure hydraulic types operating to 1500 p.s.i., in a range of mounting styles to meet all requirements. There is a complete line of Hanna Valves including hand, foot, solenoid and pilot operated, which provide a wide choice of control.

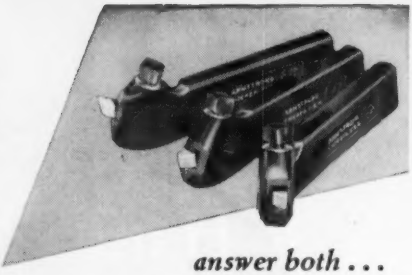
Write for Bulletins 255 and 256 on Hanna Cylinders.

Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT CYLINDERS VALVES RIVETERS

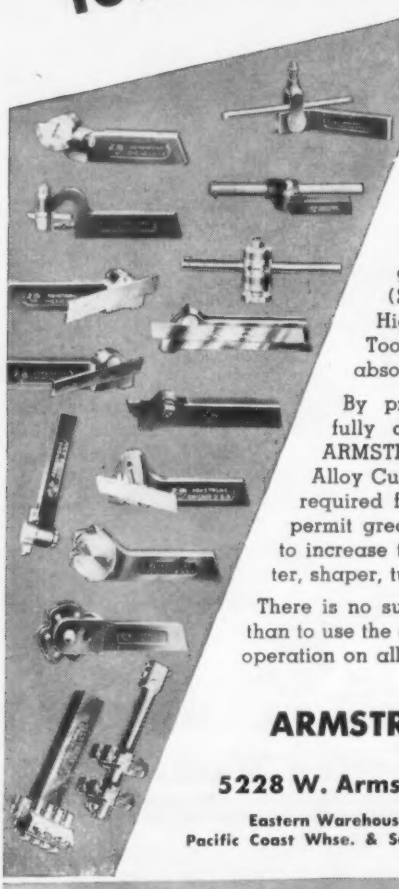
1758 Elston Avenue • Chicago 22, Illinois

ARMSTRONG TOOL HOLDERS



answer both . . .

1. *The problem of lowering costs*
2. *The problem of increasing output*



By providing permanent, multi-purpose, inexpensive ARMSTRONG TOOL HOLDERS that use cutters or bits that are quickly ground from standard high speed shapes (Saving: All Forging, 70% Grinding and 90% High Speed Steel), the Armstrong System of Tool Holders will reduce your tool cost to an absolute minimum.

By providing stronger, more efficient tools, carefully developed for each operation, as well as ARMSTRONG High Speed Steel, ARMALOY Cast Alloy Cutter Bits or Armide Carbide-Tipped Cutters as required for each job, ARMSTRONG TOOL HOLDERS permit greatly increased speeds and feeds, enable you to increase the hourly output of every lathe, planer, slotter, shaper, turret lathe and screw machine.

There is no surer way to lower costs and increase output, than to use the correct ARMSTRONG TOOL HOLDER for each operation on all machines.

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MODERN
Machine Shop

features
in this issue

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JULY, 1954

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Industry Faces Two Kinds of Competition

By HERBERT L. TIGGES*

These, according to the author, are the competition which goes on unceasingly between the various segments of our business and industry, and the competition we face from outside our borders.

IT IS rapidly becoming apparent that today we of the so-called "free world" face what amounts to two kinds of competition.

The first, of course, is that which we pretty much expect and understand—the competition which goes on unceasingly between the various segments of our business and industry. It is a healthy sort of competition. It is competition between individuals as well as companies to outperform one another. It is a kind of competition from which we have grown and prospered.

We believe in and accept the philosophy that only as we continue to compete, to find new and better and less expensive ways of doing things, new or improved methods of making the millions of products which, together, contribute to our high standard of living, that we can hope to maintain the economy of our nation on an active, self-sufficient plane.

The second form of competition we face comes from outside our borders. It is, in effect, a new sort of competition. But it isn't what you think. It isn't the competition of trade, of maintaining or expanding the volume of our foreign business. On the contrary, this second form of competition to which I am referring—and which I think vitally concerns us all—is a competition for the minds of men. *It is a three-cornered battle of ideologies, a battle of our democratic way of life against a system of State Socialism on the one hand and of Communism on the other.* It is a battle in which government supplies all initiative — and

* *Executive Vice President, Baker Brothers, Inc., Toledo; President, National Machine Tool Builders' Association.*

parcels out all benefits, or none at all.

This is a different kind of competition than we have been up against before. And just how to meet it still appears to baffle some of our most able politicians. But suppose we look at it in terms we already understand. Suppose we put it on the same basis as the competition which we meet every day in our business relationships.

If, in other words, we regard this competition between ideologies as a situation in which *politically* these other forms of government are, in effect, promising they can do more for the common man than democracy can, we have a means of counterattack—a point from which to launch our own sales pitch. At the risk of oversimplification, what we have got to do is *prove*—all over again — and more dramatically than ever—that when it comes to improving the lot of the common man, there is no system anywhere in the world like the American free competitive system.

Herbert L. Tigges

We have developed a dynamic economy in the United States. It is an economy which assumes progress as the normal state of affairs. Everybody in this country has the idea that this year he can get more and better things than he got last year. This is one of the basic elements of faith in the American system. Now, if we want to preserve this system, we must preserve this faith; and we can only do it by performance.

It is up to American industry to prove that more people can get more of the things they want under our free competitive system than they can under the Communistic system, under the Socialistic system, or under any other system yet to be devised by mankind. *But to make this proof, American industry must, each year, year after year, be able to provide the average American citizen with more of the things he wants in return for his day's work.* This, of course, brings us right back to such competitive weapons as cost reduction, increased productivity, and new and improved machine tools.

The margin by which one American concern after another survives and surmounts the anticipated saturation of its market remains the marvel of the business world. In fact, to some of our enemies who for years have been talking about and looking for the collapse of the "capitalistic economy" of the United States, the fact that it doesn't come off must be downright discouraging.

Well, why doesn't it "come off" Why is it seemingly impossible for us to run out of ideas for inventing new—or improving present—goods and services? Why is it that we never seem to run out of ability to make our products at prices which are attractive to an ever-widening number of eager buyers?

Everyone, of course, has his own answer to these questions. And the answers aren't all the same by any odds. But, however much they may differ as to details, they have one thing in common — the continued

"It is a three-cornered battle of ideologies . . ."

confidence of practically every thinking American in the ability of American industry to find ways and means of making things at prices which will bring them within the reach of more and more people. Nothing, fortunately, has yet upset this confidence. Not the rising wage rates of recent years. Not the mounting burden of taxes. Not even the interruptions to production which have beset many industries subject to the growing pains of organized labor.

What, then, is this confidence founded on? We in the machine tool industry think it finds its greatest support in the recognition which is more and more being accorded the importance of transferring the burden of production from men to machines.

There was a time when to cut costs it was considered necessary either to (1) pay men less, or (2) work them longer hours. That was many, many years ago—and before ways and means had been found of transferring the native skills of the individual to a machine on which he could turn out products at a pace far beyond anything he could match by hand.

Today, the way to cut costs — demonstrated over and over again — in industry after industry — is not alone to replace a man with a machine, but at frequent intervals to replace that machine with a newer model which will perform the work better, cheaper, faster, or a combination of all these and more!

It is this ability—every once in a while — to make a new advance in production—to put new vigor into old competitive situations—that has quite literally been the salvation of the industrial and social structure as we know it here in the United States.

This structure has been founded primarily upon the competitive system. By contrast, the economic and social structures of the majority of the other nations of the world depend for their existence upon a system of cartels, allocations of markets, price fixing, protection by the

government of marginal producers and interference by the same government in the functioning of the law of supply and demand. The greatness of this country of ours has been built on the free exercise of competition — competition between individuals as well as between companies.

There are a good many of us, in industry, who recall very well former periods in our country's history when extremely keen competition was the order of the day. And looking back to those periods, I think it could be proved historically that the foundation of the greatest progress made by our nation in product development, in engineering, in machine design, in potential employment, and in improving the standard of living, was laid in the periods of the most intense competition.

All of this is no better exemplified than in the machine tool industry. Here is an industry that—whether it fully recognizes it or not—depends upon competition among its customers for its very existence. *A machine tool is purchased for one reason and one reason only — to cut someone's production cost.* It isn't purchased because it is a beautiful mechanism. It isn't purchased because it has a streamlined design like an automobile. It isn't purchased because its new paint job looks good in the shop. It isn't purchased because it has some new trick gadget which intrigues the manager.

We as machine tool builders may think we are selling just so much machinery, but we are doing infinitely more than that. What we are selling is equipment which will permit a "lower cost per piece produced." Under our great competitive system, the concern which succeeds over the years does so because it continues to give its customers the best values. As a consequence, it gets and continues to get that customer's

"...American industry must ... provide more things ... in return for day's work."

business. The concern which fails to do this sooner or later loses out.

To us in the machine tool industry this is an old, old story. But because it is a story still unfamiliar to or still unaccepted by many of our so-called "social" thinkers, we feel it imperative to tell it—and retell it—at every opportunity.

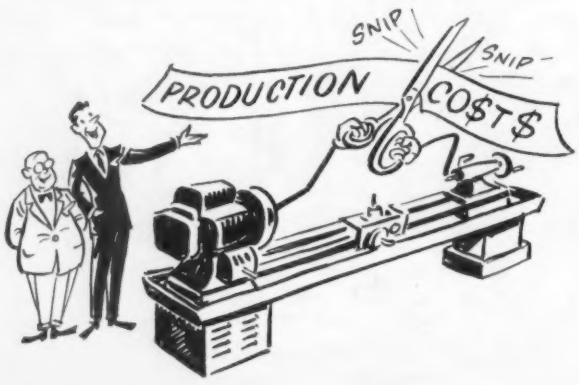
It boils down to this—to give its customers the best values, a concern *must* reduce—and keep reducing—its costs. With wage rates fixed, or continuing to climb; with any very substantial tax relief wholly problematical; with most overhead items virtually impossible of reduction, the *only* means remaining today by which manufacturers can cut their costs is that of replacing their obsolete, high-cost machine tools with new machines which can turn out more work in less time and yet of a high quality which today is achieved by ingenious machines rather than through the skill alone of the individual operator.

Does the machine tool industry have new models of machines with which to accomplish these further material reductions in production costs? We think it does, and we can list certain trends in new machine design that are already in process of being satisfactorily worked out and applied, toward these objectives.

For the most part, these trends concern themselves with seven things: Advances in automatic operation; Faster tool-cutting motions; Development of automatic machinery; Advances in electronic controls; More rugged construction to match the capacity of better cutting tools; Better work-holding devices; and Faster loading and unloading, to match faster cutting or forming time.

Every one of the foregoing trends implies a further cutting of production costs. But we must be very sure that we understand that these new machines do not accomplish their miracles of production by destroying jobs. Again and again throughout all industry it has been demonstrated that improved machines create jobs.

More specifically, throughout our whole industrial history it has been shown repeatedly that employment increases in almost direct ratio to improvements in mechanization of industrial processes. This story, as put in terms of machine tools, is not a complicated one. In fact, it is a very simple one—machine tools enable a manufacturer to reduce the



"A machine tool is purchased . . . to cut production cost."

". . . more people can buy the products of American industry."

cost of his product; as the cost goes down, more people can buy his product; as his production goes up, he can employ more people; and *as more people are employed, more people can buy the products of American industry.*

This larger production volume in turn makes posible further mechanization which, under the operation of our free competitive system, reduces costs still further. This is a cycle which has made our country what it is today—the cycle which has put our standard of living, and our range of opportunity for the individual citizen far beyond that of any other country in this world of ours.

A clear cut understanding of this pattern is vital today. It is vital not alone to engineers who are already well acquainted with these technological possibilities, but to all our citizens. Both technical-and-non-technical-minded Americans must learn to evaluate these industrial developments in the light of social relationships as well.

You and I know that standards of living cannot be improved by idealistic theories alone, but can only be brought about in fact by technological improvements. But the idealistic theorists in our government and other governments are not technical men, and their concept of the world of tomorrow is being forged along social rather than technological lines. If this is so, then the best inventions in the world will be no protection against a regimented form of government unless it can be demonstrated that those inventions are being continuously translated into higher living standards for all the people.

Three great systems are now competing for world support—Communism, State Socialism, and the American free competitive system. It is up to us to show that our system can do the most, for the largest number of people, over the long run. It is my contention that doing the most for the largest number of people is, in the last analysis, a proposition of increased productivity and reduction in cost per piece produced. That, I am firmly convinced, more than ever, is the function of machine tools today.

How to Guarantee Your

In which the author explains how production efficiency and production control can be readily obtained in small and medium sized plants thru the installation of a new and unusual accounting system.

By Ed Stern*

IS IT not true that most job machine shops look forward to the day when they have developed a product of their own that will guarantee "security"? A job machine shop is a unique kind of operation in that the owners are always striving, in effect, to get *out* of the business.

Why? Many reasons could be given, but the real one is that the machine shop operator is in a highly competitive field and at the same time is running his business "in the dark." He may *think* that he has a good idea of how much each job is costing him, how efficient each of his men is, how to schedule work on the machines so that it flows evenly, how to meet delivery commitments and all of the other important answers—but truthfully, he does not, and feels that he cannot afford to spend the money necessary to get this information.

So far as keeping records is concerned, all is confusion in most machine shops. I know, because we've been through it. *But keeping records is the difference between a smooth organization and chaos in this business,* and I am prepared to give 100 per cent proof of that statement.

We have learned how to keep very accurate records, at a cost insignificant in comparison to the additional benefits, by using a remarkable new accounting machine for this purpose.

How It Came About

We realized that small companies who *know costs* have a terrific advantage over competitors, because they can cost jobs and bid jobs correctly. It inspires tremendous confidence in a customer when he knows that you are getting efficiency in your organization. This is true of the fixed price customer, of course. But on time and material

* Vice-President, Acorn Tool & Mfg. Inc., Cincinnati, Ohio.

Own Success

jobs, too, knowing costs keeps down the price, brings in more orders, and enables you to put more jobs through the shop.

That was the idea—knowing costs—that originally caused us to explore the possibilities of an accounting machine. Operating on limited capital, we also wanted to know what our cash position was, and what it was expected to be, at any given time.

Knowledge of Operation

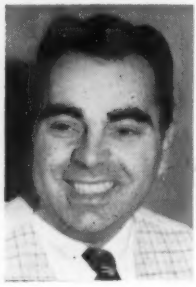
The actual knowledge that this accounting machine has given us far exceeds simply the matter of knowing our over-all costs. We know now exactly how efficient every man in the shop is; we know our work in process at any given moment, where every job is and how much of it has been finished. We can schedule jobs in advance and state the exact day of delivery. We can direct the flow of work so that each machine is correctly scheduled at all times. We know precisely how much each job has cost. And, of course, we can quote a price with absolute accuracy, because we know exactly what our costs are going to be.

Production efficiency and production control may be almost "unheard of" in the small machine shop, but they should not be, because these are the things that help as nothing else can—and they are easy to have, with the system we now use. The average efficiency of our men, for instance, has been raised appreciably since the installation of our new accounting system.

More and more customers are getting to know that they can depend on our delivery as well as our price, factors which give our salesmen a terrific advantage. Also, we can tell our salesmen where we have a "light load" so that they can sell for future delivery on that machine group; in other words, *channel* their sales efforts.

The System Itself

Let us describe now (at last, did you say?) the actual system itself. First, we determined our own standard costs, working with a Certified Public Accountant who is also a cost expert. Then we worked out the details of the accounting machine operation with a representative of National Cash Register Company—who, incidentally, gave us many new ideas as well as meeting the requirements we already had in mind—and bought from him a "Class 31" machine, of the type shown in Fig. 1. Perhaps it is only fair to mention that the "31" was the only machine which we could find at the time that was capable of doing the job satisfactorily.



Ed Stern

Master Work Card

Glance if you will at the illustration of our "Master Work Card," as presented in Fig. 2. This is prepared, by me or by one of my able assistants, for every job that comes into the shop. It is in three copies —the first for production control, the second for determining employees' production efficiency, and the third copy for insertion in the shop file.

The first column at the left is for the operation number; that is, which operation is to be performed. The second column shows what machine is to do the work. The "Min./Pc." column shows the standard number of *minutes per piece*. "Set" is the set-up time allowed, in hours. "Std." represents the total standard time for the operation. In the illustration, the standard of 20 hours shown on the first line is determined simply by multiplying 100, the number of pieces, by 12.0 minutes, and then dividing by 60 in order to get the time in hours.

Notice that we use continental time—hours and tenths of hours; our time clocks are precisely set to record in this particular manner.

Posting Employees' Time by Accounting Machine

A Job Ticket, such as shown in Fig. 3, must be written and punched on a time clock for every job that is done by anyone in the shop. The accounting machine operator takes these tickets, each day, and sorts them down by employee clock card number. She then goes right to the machine. I am going to outline her whole procedure, by steps, because I think it will be interesting to you. You can see each step by looking at the illustration of forms.

On the Employee's Daily Report of Efficiency, as shown in Fig. 3

Fig. 1 — Accounting machine operation is easy, requires no highly trained expert. Note regular adding machine keyboard and standard keyboard electric typewriter on the machine. Operator enters figures, types where necessary; the rest of the work is done automatically by the machine.

(one of which is prepared for eac prepared for each employee, every day), the operator enters:

1. Employee (clock) number,
2. Day or night (10 hours or 9),
3. Stop operation (read from Job Ticket),
4. Start operation (read from Job Ticket),
5. Lunch period of .5 *if* the hours of 11.7-12.2 (the half hour for lunch) fall between the start-stop time.
6. Machine automatically prints the actual time consumed.

The operator then pulls out the Master Work Card for that job and using a separate calculating machine which is located right next to the Class 31 machine, multiplies the number of pieces completed (as shown by Job Ticket) by the standard minutes per piece (from Master Work Card), divides by 60, adds set-up time, if any, and

7. Inserts standard time in "Standard Time" column.
8. Machine automatically prints plus or minus efficiency, in hours. (Minus efficiency prints in red).
9. Operator enters schedule data,
10. Work order number,
11. Operation number,
12. Machine number and, *if the the operation is completed,* a "C" following the number,
13. Part number,
14. Customer's initials (date prints automatically).

The operator then pulls the Work Order Job Card—you might call it just the Job Card—from a file, and inserts it in the machine. The machine *automatically* prints, on this card:

15. Machine operation number,
16. Date,
17. Employee number (clock number),
18. Work order number,
19. Actual time spent.
20. Operator picks up previous balance of time in hours (shown on Job Card).

ACORN TOOL & MFG., INC. MASTER WORK CARD PROD.

DESCR. SPACER SHIPPING DATE 2/10/54 W.O. 5443

PART NO. 126457 CUST. Williams Co. QUAN. 100

OPER.	MACH.	DESCR.	MIN. / PC.	SET	STD.	START DATE	TOOLS
1	2	Mill, Right Flange. Rough	12.0	2.0	20.0	204	22.0
2	2	Mill, Right Flange. Finish	20.0	1.0	33.3	207	34.3

SHEET OF

Fig. 2—A Master Work Card is prepared for every job coming into the shop, and is used as a basis for determining production efficiency and production control.

21. Machine prints balance of time spent on this job to date.

If there is another Job Ticket for the same employee, which, of course, is frequently the case, the above operations are repeated for that Job Ticket. After the last Job Ticket for that employee has been processed, the "31" machine is permitted to return to the "No card for time" position on the Employee's Daily Report of Efficiency, as shown in Fig. 3, where it prints ".00" if all time has been accounted for. If there is any time that has *not* been accounted for, the machine prints the amount of that time. It then moves into position to receive the Employee's Efficiency Record, Fig. 3, a *weekly* card. The operator inserts this weekly card from file, and machine automatically prints:

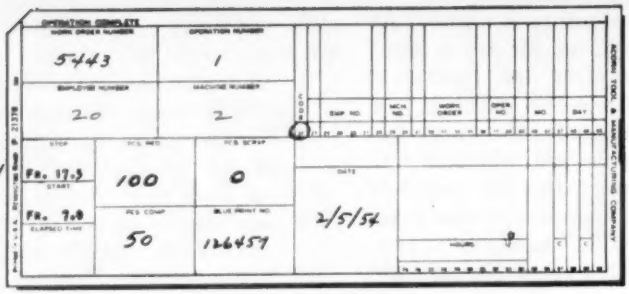
22. Employee number (clock number),
23. Date,
24. Efficiency today.
25. Operator picks up previous balance of efficiency either plus or minus (from card).
26. Machine prints efficiency to date.
27. Operator types employee's name.

All of this seems very lengthy in describing it, but the actual operation is accomplished at a very high rate of speed. All entries are automatically recorded on a Journal Sheet locked into the machine; all Employee's (weekly) Efficiency Record entries are automatically recorded on an Over-All Daily Efficiency Record locked into the left side of the machine.

When the operator has processed each employee's Job Ticket, these are the records we have:

1. An Employee's Daily Report of Efficiency for each worker. This is given to him so that he can see how well he is doing from day to day. Also, in case there is any time not accounted for (which might be a misplaced Job Ticket, and so on) he can see this and straighten it out.
2. An Employee's Efficiency Record (weekly) that *we* can use to determine a man's efficiency, and also as a basis for the weekly payroll.
3. An Over-All Daily Efficiency Record showing each man's name and efficiency for the day. This is used first to make the entry on our Efficiency Graph (Fig. 4), and is then hung up in the shop each day so that every man can see how he stands in comparison to the others.
4. Up-to-date postings on all Job Cards that were affected for this day. As mentioned, we have a Job Card for every job in the shop; these are automatically kept up-to-date by the machine.
5. Journal Record of all entries.

Indirect Labor is posted separately, in exactly the same manner as Direct Labor, except that no standard time is used; the actual time itself is simply inserted again in the "Standard" column. At the end of each day, we know exactly how much has been spent for both Direct and Indirect Labor, and the ratio between them. We see to it



OPERATION COMPLETE

WORK ORDER NUMBER	OPERATION NUMBER
5443	1
EMPLOYEE NUMBER	MACHINE NUMBER
20	2

STOP	PCS. MFD.	PCS. SCRAP	DATE
Fr. 17.5	100	0	2/5/54
START			
Fr. 7.0	PCS. COMP.	BLUE PRINT NO.	
ELAPSED TIME	50	126457	

JOB TICKET

Name Williams Co.
Work Order No. 5443
Description

NAME Chuck Zwick

No Card For Time	Clock No.	10 Day 9 Nite	Stop Opr.	Start Opr.	Lunch Time	Actual Time	Stand. Time	Plus Minus	Sched. Date	Work Order #	Opr. No.	Mach. Opr. Status	Part Number	Date	Cust
00	20	10.00	17.50	7.00	.50	10.00	10.00	.00	2.04	5443	1	20	126457	FEB 5	WI

DAILY EFFICIENCY RECORD

that this ratio remains "right."

Let's look at some of the results we have from the records just described, bearing in mind that they are *all created very easily and very rapidly by the girl who runs the "Class 31" machine.* First of all, these production efficiency records enable us to keep the good men on our payroll, the ones who really make money for the company, and to let those on the bottom of the ladder go, after fair warnings. Those whose efficiency is high get paid by far the highest wages in the area, and they deserve it, because they produce. We also award prizes for top efficiency.

Fig. 3—From Job Tickets, the Daily Efficiency Record of the employee, the Job Cards, the Weekly Efficiency Record, and the Daily Over-All Shop Efficiency Record are prepared simultaneously on the accounting machine. Master Work Card is referred to when determining Standard Time.

JOE FOX	10	FEB 5	.50CR	.50	1.00CR
FRANK WILLIAMS	12	FEB 5	.00	1.00	1.00
ROBERT JONES	15	FEB 5	.50		.50
HARRY MILLER	17	FEB 5	.10	.20	.10CR
BILL DAVIS	16	FEB 5	.50CR	.50	.00
CHUCK EMICK	20	FEB 5	.00	1.00	1.00CR

DAILY OVER-ALL EFFICIENCY RECORD

JOB CARD W.O. 5443

Date	Clock No.	Work Order No.	Hours to Date		
			Today	Previous	Balance
FEB 4	19	5443	10.00		10.00
FEB 5	20	5443	10.00	10.00	20.00

JOB CARD

EMPLOYEE'S EFFICIENCY RECORD -20-

Name Emick, Chuck Rate Class

Employee's Name	Clock No.	Date	Efficiency to Date		
			Today	Previous	To Date
CHUCK EMICK	20	FEB 3	.10CR		.10
CHUCK EMICK	20	FEB 4	.90CR	.10	1.00
CHUCK EMICK	20	FEB 5	.00	1.00	1.00

WEEKLY EFFICIENCY RECORD

The fact that we know exactly how good each man is, and let him *know* that we know it, by giving him an efficiency record every day and also posting the daily list, with each man's name on it, in the shop, is what has made it possible for us to raise average efficiency appreciably since the installation of this system.

Here is a graphic illustration of what happens when a man's efficiency is raised. Suppose we are charging the customer $5.00 an hour for a man's work, and that he works at 70 per cent efficiency. Actually we are selling his labor hour at $3.50. If his wages, plus overhead, amount to $3.44 an hour, we

are making a gross profit of 6 cents an hour on his work. By hiring 20 per cent more efficient labor at a much higher rate, we are selling at $4.50 an hour, giving a much greater gross profit proportionately. And again let me say, *we* do pay very high wages indeed to the men that deserve it, through efficiency. As a result, our men like the system; they like not only the greatly increased wages they can get, but also the recognition for doing a good job, which is important to any man. The only ones who don't like our accurate records are those who do not produce.

Another extremely important record obtained from this operation is the Job Card. We can glance at the card at any time and see precisely which operations have been performed, the time spent, and the employee or employees who did the work. When the job is finished, we know exactly how much it cost, by operation.

The Journal Record "gives the whole picture." If someone wants to know, for instance, "Who worked on Work Order 5571 on January 11th," a glance at the Journal Record for that date will immediately give the answer .

Production Control

"Production control" sounds like a rather big league term, but all it means is that we know how much work has been scheduled for each machine group (we have seven machine groups), and how much of that work has been done. We get these answers in a very simple manner, using the "31" machine.

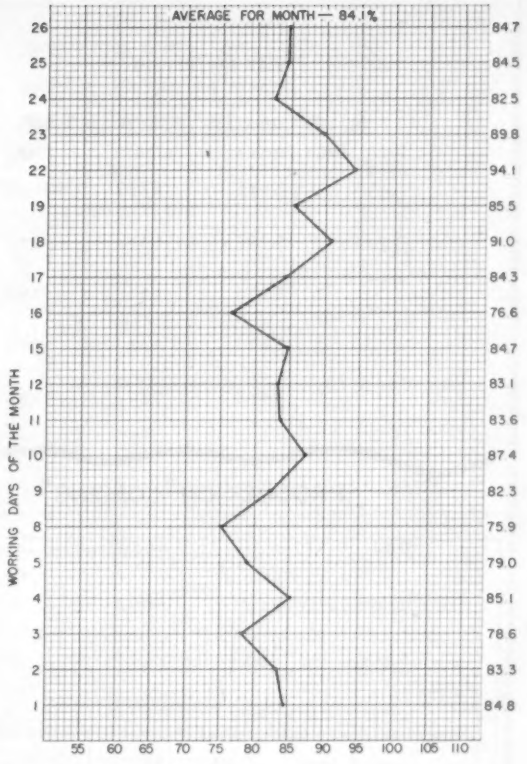
There is a "Production Control Card" (Fig. 5) for *each week's* work, on each group. In other words, these cards are filed by machine, by starting date.

The first copy of the Master Work Card, filled out by me for every job coming into the shop, is used to "load" the Production Control Cards. Please take another look at the illustration of this Master Work Card (Fig. 2); notice that it shows the operation number, machine number and starting date for each operation. This information is "loaded" onto the Production Control Cards. The girl simply posts to the proper Control card, for the starting date indicated. For example, the first line on the Master Work Card illustrated shows Operation 1 on Machine 2, starting February 4. The girl posts to the February 3-10 Machine 1 Production Control Card. (February 4 falls between the 3rd and 10th.) If the starting date were, say, February 23, she would post to the Machine 1 card for February 19-26. In each case, the operation number is shown (see illustration of Production Control Card).

Thus, every machine operation that has to be performed is posted, according to machine and starting date, to a card. This is what we call "loading" the Production Control Cards. It is the work load that we have to do.

"Unloading" the cards is accomplished, by the girl, using the daily Journal Record. You will recall that in posting employee's time (see step 12 of that operation), a "C" is placed after the machine number, *if* the job is completed. This "C" appears, of course, on the Journal Record. The girl simply goes down

Fig. 4—Sample shop efficiency graph.



the Journal and, each time she comes to a "C", she posts this machine operation as having been completed, selecting the proper Production Control Card. This posting is also done by machine.

"Loading" and "unloading" are done once a week; there is no need for us to have it on a daily basis. Now, when the job is finished, each Production Control Card shows exactly how much work remains to be finished on each job. The girl then runs through the cards and, again using the "31" machine, makes a listing of the *current week's work*; that is, work that was started or should have been started, as of this week. The listing, Figs. 6 and 7, shows Operation Number, Machine Number, Work Order Number (Master Work Sheet Number), Starting Rate, and Estimated Time for completion.

This listing, which is really a complete Work-in-Process schedule, tells us exactly what has to be done currently on each machine, and when it is expected to be completed. We can see right away whether a job is being done as scheduled or is falling behind. When it happens that a job should have been started, but was not, the situation is rectified immediately.

Because we have this listing, we can see which machines currently have a heavy load, and which have a light load, and advise our salesmen accordingly. Such a Work-in-Process schedule makes it possible for us to quote exact delivery dates. This, combined with the accurate knowledge of costs we get from our Job Cards, puts us in a very advantageous position competitively.

Record keeping like this has cut our costs considerably and it can cut costs for any machine shop. Furthermore, *anyone* who can run a machine shop at all can easily understand such records. They may

MACHINE LOADS

WEEK OF FEB. 10

OPER	MACH	WORK ORDER	START	EST. TIME
4	2	5.222	1.30	5.00
2	2	5.343	1.30	2.50
5	2	5.350	1.31	7.50
3	2	5.423	2.03	2.50
1	2	5.443	2.04	22.00

PRODUCTION "LOADING"

Week of March # 2 — 2-03-10

Oper.	Load Center	Work Order	Starting Time	Estimated Time	Total	Clock No.	Completed	Unit	Date
3	2	5.423	2.03	2.50	2.50				
1	2	5.443	2.04	22.00	24.50				

PRODUCTION CONTROL CARD

Fig. 5 — Production Control Cards being "loaded" with work that has to be done. They will be "unloaded" as jobs are completed, and at the end of the week show exactly how much time remains on each machine, by operation, for the coming week. They provide the basis for the weekly machine scheduling reports.

sound hard when such terms as "Production Efficiency," "Production Control," "Work in

Fig. 6 — Each week, machine scheduling reports are run on the "Class 31" machine, the information being taken directly from the Production Control Cards. Notice that one report is made for each machine (although only one of them is shown here). At bottom of schedule, the accounting machine shows total estimated time for the coming week. These schedules are run off in a matter of minutes.

ACORN TOOL & MFG. INC.

MACHINE SCHEDULING REPORT

MILLS &. SHAPER WEEK OF FEB. 24

OPER	MACH	WORK. ORDER	START	EST. TIME
6	2	5.105	10.22	21.00
1	2	5.558	11.09	18.50
2	2	5.558	11.11	1.30
5	2	5.558	11.16	2.00
6	2	5.558	11.17	1.50
6	2	5.106	11.24	4.80
3	2	5.556	11.26	100.50
1	2	5.501	12.07	145.00
15	2	5.541	12.08	2.50
20	2	5.541	12.09	1.40
2	2	5.560	12.08	30.50
30	2	5.541	12.11	1.60
35	2	5.541	12.14	2.60
2	2	5.501	12.18	74.00
4	2	5.554	12.22	7.10
2	2	5.561	12.18	2.30
80	2	4.559	1.05	8.50
40	2	4.558	1.04	8.50

Process," and so forth, are used, and maybe I shouldn't have used them—but the fact of the matter is that it is as simple as A-B-C. For instance, anyone can see, from a listing of each job showing when it was started, estimated time of completion, and how much has been done, whether or not it is "up to snuff." Anyone can see exactly how much each job, and each operation, is costing him, just by looking at the Job Order Cards. When there is a

ACORN TOOL & MFG. INC.

MACHINE SCHEDULING REPORT

TURRET LATHES WEEK OF FEB. 24

OPER	MACH	WORK ORDER	START	EST. TIME
1	1	5.105	10.12	22.00
3	1	5.105	10.19	15.50
2	1	5.108	9.14	59.00
2	1	5.111	9.17	11.00
3	1	5.111	9.20	22.00
1	1	5.536	10.19	61.70
1	1	5.348	11.10	18.00
1	1	5.106	11.18	5.80
2	1	5.106	11.19	10.50
3	1	5.106	11.20	4.50
10	1	5.563	11.27	2.50
1	1	5.535	12.03	24.70
15	1	5.512	12.23	5.50
10	1	5.582	12.22	57.00
10	1	5.486	1.05	3.20
10	1	5.587	1.13	7.70
10	1	5.580	1.14	30.80
5	1	5.537	1.22	55.50

Fig. 7 — Each week, machine scheduling reports are run on the "Class 31" machine, the information being taken directly from the Production Control Cards. Notice that one report is made for each machine (although only one of them is shown here). At bottom of schedule, the accounting machine shows total estimated time for the coming week. These schedules are run off in a matter of minutes.

listing of each man, showing his efficiency rating, it is no problem at all to know which are the best men and which could stand improvement. And so on down the line.

The problem has always been not how to put such information to good use — any machine shop operator can do that—but how to *get* such information, at reasonable cost. That problem has absolutely been solved by this accounting machine; it has more than paid

for itself every year and it becomes worth *more* to us every year. So it has "cost" us far less than nothing at all.

Accounts Payable and Accounts Receivable

The Accounts Payable function is also done on the "Class 31." The Check, Remittance Advice, Accounts Payable Journal and distribution is all done and proved at one time. We used to do all these jobs separately, in pen and ink, so you can imagine what a timesaver this has been. Accounts Receivable, too, is a machine job—and as the machine does the work, it also automatically prepares a report for us showing what our cash position should be one week from now, two weeks from now, and so on for the next month.

Payroll

The Payroll Journal, Check Register, Check, Employee's Pay Statement, and Earnings Records are created simultaneously by machine. Earnings, Withholding Tax and F. I. C. are computed *to date* on each Earnings Record. The machine also figures gross and net pay automatically and adds the journal as postings are made. Payroll for our eighty employees takes only a little over an hour to write by machine. Our W-2 and 941a reports are machine jobs, too.

These, however, are just "extras." To be sure, the Payable, Receivable and Payroll Jobs are done far more easily and accurately by machine than we could ever do them by hand —and in much less time. But these are just bonuses. The big things are: knowing costs, knowing efficiency, and knowing the status of each job.

We are interested in developing a product of our own and selling it, but that is not our primary objective. We like the job machine shop business for its own sake, because we have information that the next fellow doesn't have. And you can do the same thing — guarantee your own success.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

"That was bad enough, but let me tell you about the poor fellow who kept a tool out *overnight.*"

The General-Purpose Tool Has a Place in Today's Modernization Program

By Frederick S. Blackall, Jr.

The author emphasizes the tremendous field open to machine tool builders who will simplify the design of some of the basic machine tools and make them available at prices not possible, cost-wise, for more complex type machines.

LAST autumn, in an address before The American Society of Mechanical Engineers, the author of this article made the observation that machine tool builders, *in their eagerness to meet the demands of the mass-production industries, had rather gone off the deep end in emphasizing massiveness, a multiplicity of controls, and a high degree of automaticity in all or a majority of their machines—features which in many instances were neither needed nor desired by the general purpose user.* From this premise, there followed the conclusion that a tremendous field is open to the machine tool builder who will simplify the design of some of the basic machine tools and make them available to the general public at prices which would not be possible of accomplishment, cost-wise, for machines of the more complex type.

This opinion, hazarded innocently enough out of the book of experience in a field in which small- or medium-lot production is the rule rather than the exception, excited such a storm of controversy and in some cases outright amazement (that a machine tool builder should utter such heresy!) that it deserves a little elaboration.

First let me make it clear that I do not attempt or intend to generalize in this particular. The late and

great William Lyon Phelps, Yale's famous pundit, used to preach to his classes in English literature that generalities were the refuge of women and fools! Thus there is no implication here that the present trend towards automatic operation, the ultimate in feeds and speeds, and all of the other features which will generate the highest possible productivity in mass-production operations are unimportant. Indeed, quite the contrary. If we are to hold our own in world competition against producers whose labor rates are a quarter to one-third of ours, it is vitally necessary that we develop and maintain a full range of machine tools which will outperform and outproduce the best which are offered by Germany, Switzerland, Scandinavia, Great Britain, and the rest of the world. The preservation of our high standards of living demands that we continually lower the real cost of the mass-produced necessities and amenities of American life. Furthermore, in the world race for commercial supremacy, the volume competition will be borne by the mass-production industries. Thus American machine tool builders must be alert to hold the lead which they now enjoy in the special field of tools for high production. Thus I stress again that my parallel interest in the development of general purpose machine tools does not imply a lack of appreciation of the vital importance of this market.

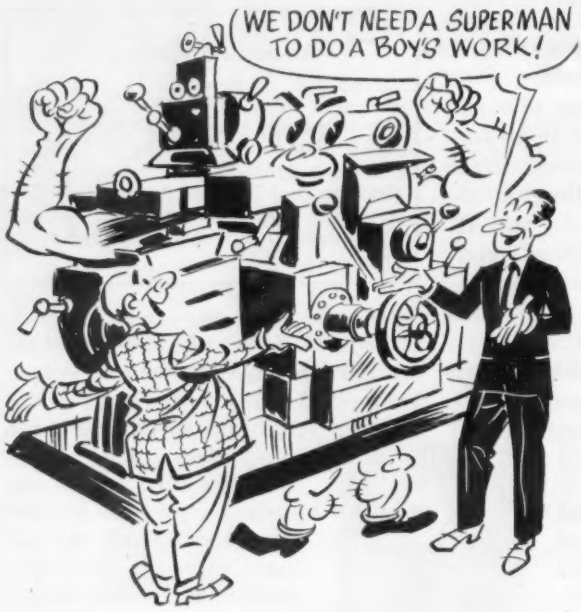
Frederick S. Blackall, Jr.

But we Americans are notorious extremists. Once we conceive that we must achieve a given objective, we tend to concentrate our efforts to that end to the exclusion of all others. This almost fanatic devotion to our purposes is one of the great sources of our nation's strength, but occasionally it develops into a certain myopia — a tendency to overlook other objectives which are equally important. This is notably true where the problems which must be solved break down into two or more categories of fundamentally different character. Such is the situation in the field of metal cutting.

American industry—and even less so the industry of the rest of the world—is not composed exclusively of mass-producers like General Motors, Chrysler, and the great electrical machinery manufacturers. Although such concerns are of outstanding importance to our economic welfare, they provide something less than one-half of the total manufacturing employment, and purchase no more than a proportionate share of the total machine tool output. The balance of industry is quite as im-

About the Author

Frederick S. Blackall, Jr. is president and treasurer of The Taft-Peirce Manufacturing Company of Woonsocket, Rhode Island. He is a past president (1951-52) of the National Machine Tool Builders' Association. He is also a past president (1952-53) of The American Society of Mechanical Engineers.



". . . off the deep end in emphasizing . . . a high degree of automaticity . . ."

portant, quite as big in overall production, quite as substantial a purchaser of capital goods—indeed, in the aggregate, probably more so. And though the latter also needs a certain grist of mass-production machinery, its output tends to be broken up into what would be regarded in Detroit or Schenectady as small or medium lot production, and certainly, from month to month and year to year, into a vastly greater variety of product. For manufacturers such as these, the general purpose machine tool, which can be purchased for a reasonable price and can be adapted readily and with minimum setup time to a multiplicity of jobs, constitutes a vital need. *It is a need which too often tends to be forgotten by the machine tool designer and sales manager.*

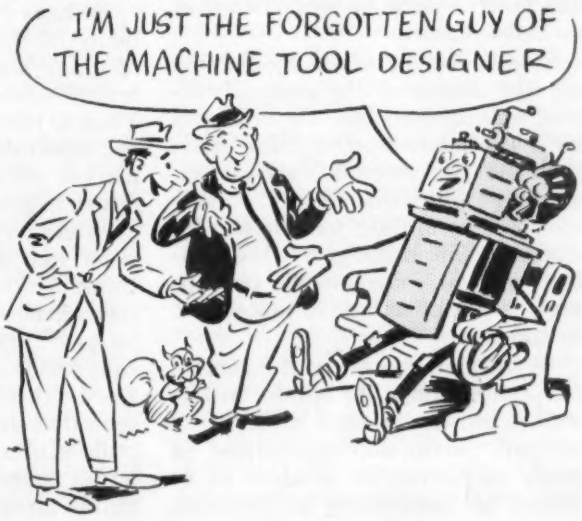
Even within the mass production industries, there are a great many operations which can be performed just as rapidly on a simple design of general-purpose machine tool as they can on one of the more complex models. In such cases, many of the more expensive features simply are not used. They have to be paid for, nevertheless. Some of this complexity is never needed by the average user, and much of it is needed only part of the time by any user. In brief, there is a place for the machine tool which is the ultimate in ruggedness, high speed, variety of special features, and automatic controls; but there is also a place, and I submit that it is an equally important one, for the general purpose machine, designed for average conditions.

One of the dangerous by-products of the trend towards needless weight, heft, automaticity, and similar costly features is that many so-called standard machine tools are getting to be just too expensive for the purposes for which they are employed most of the time. It grows more and more difficult for the average company to keep its plant up to date with the proceeds of its depreciation allowances, even if the latter are supplemented by a substantial

appropriation from net earnings after taxes. This undoubtedly is a contributing factor to the alarming increase during the past few years in the proportion of metal cutting tools in American industrial plants which are over 10 years old. It is a situation which should not be ignored, for the economic health of our nation requires that our industrial plants be kept modern and efficient. The need for a frontal attack on this problem is an urgent one. Certainly a partial solution, at least, would be to make available to American industry a broad range of machine tools of adequate yet more simple design, for the performance of much of the ordinary production of industry—especially small lot production, which in the aggregate plays such a vital part in our economy.

There is another facet of this problem of the high cost of mechanical equipment which should be of pressing concern to the machine tool industry itself. That is the increasing difficulty which confronts the American machine tool builder in competing with foreign-built machine tools in the overseas market. Whereas the U. S. machine tool industry formerly delivered to foreign buyers as much as 25 per cent of its annual production, the ratio of our machine tool exports to total output has dropped to a low of 4 per cent for a certain recent period. During the past few months, I have talked to buyers and distributors in all of the leading trading nations of Western Europe and South America; the story is invariably the same: "We'd like to buy American machine tools but we just can't afford them." In brief, our general purpose machines have become so elaborate and costly in comparison with the European product that we have simply priced ourselves out of the market.

It should be emphasized that these observations represent the reaction of the purchaser of equipment for light manufacturing and toolroom use. In the mass-production field, American machine tools are still in substantial world-wide demand. But here again, in our headlong rush to build bigger, and heavier, and more automatic mass production tools, should we neglect and perhaps lose for all time the export



". . . need for general purpose machine tool . . . often tends to be forgotten by the machine tool designer and sales manager."

market for general purpose equipment, in which the United States until recently held an undisputed position of pre-eminence?

Now it may be contended that there are already plenty of general purpose machine tools of basic and uncomplicated design on the market. In a sense, that is true, but the majority of them are what you might call "poor relations"—that is, secondary lines, or garage and cellar workshop tools—which are not at all the type of general purpose machine which the high grade small- or medium-lot production shop or tool room requires. Take engine lathes, for example, or the simple turret lathe. The general purpose machine of this category should be built to the same degree of precision as its most advanced high-production counterpart. It should be capable of performing high speed turning operations with carbide tools. It should offer reasonable flexibility in its range of feeds and speeds. Ability to produce a fine finish should be emphasized in its construction.

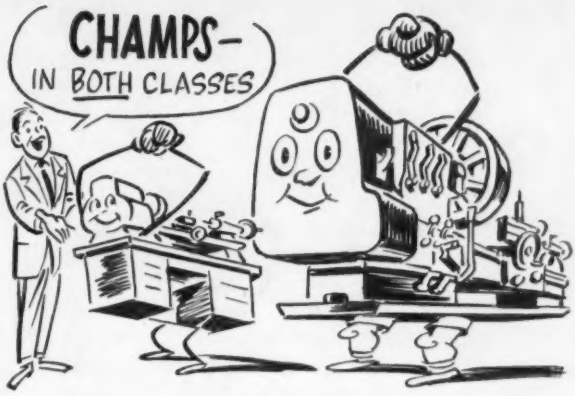
Similar considerations should govern the design of the general purpose milling machine. There should be a good selection of table feeds from the conventional to the reasonably high. Provision should be made for modern milling techniques, including climb milling, flywheel cutters, and in some models perhaps modest application of automatic features.

In the manufacture of the general purpose machine, the builder will do well to pursue the most modern and efficient production techniques in order to permit his product to be priced as moderately as possible. Standardization of parts and the maximum possible interchange of parts within a given line of machines should be sought in order to minimize costs. Components should be well tooled up and efficiently gaged, to the end that machines will virtually fall together in assembly.

It is my considered opinion that the machine tool builder who will approach the problem in this manner will be amazed at the volume of business which he can develop. Indeed, it should be easier to build up a high physical volume for such equipment than for mass-production tools where the special requirements of each large buyer have to be given consideration. The astute development of efficient and accurate general purpose machines of advanced design is not only one of industry's more urgent needs; it also holds a tremendous sales potential for the machine tool builder. But it is an opportunity to which the industry seems slow to awake.

Perhaps one reason for this is that many of the high production tools of today are the outgrowth of yesterday's general purpose machines. Thus to many a machine tool builder, especially one whose principal market centers around Detroit, a return to general purpose equipment, even as a complementary line, would seem like a step backward. Such thinking ignores the fact that tomorrow's general purpose machine will be as different from yesterday's as tungsten carbide is from carbon steel! Other critics of this thesis contend that the offer by a machine tool builder of a simple type of lathe or miller in modern design would constitute an open invitation to the cus-

". . . but offered the potential customer two types of machine . . ."

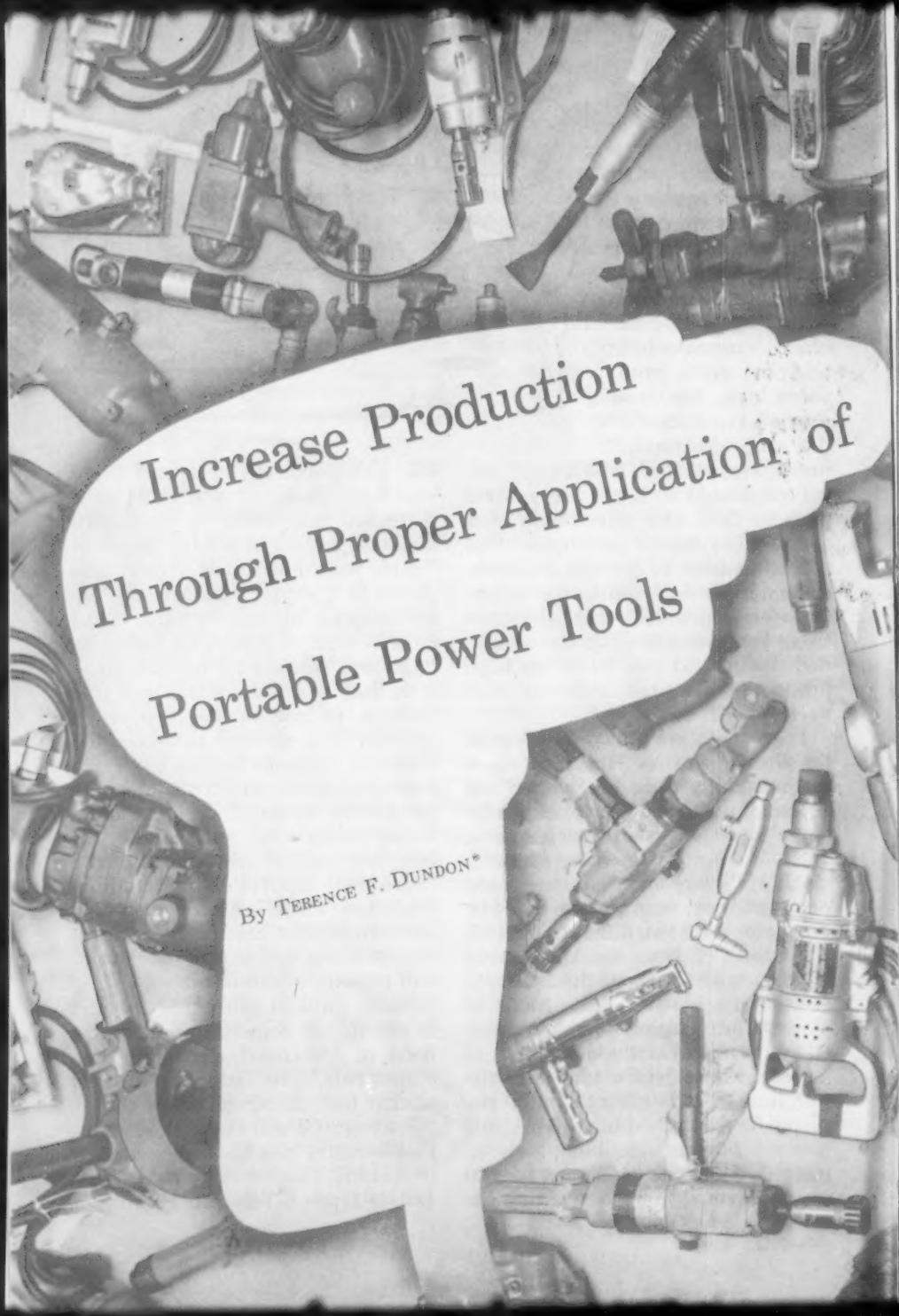


tomer to require all manner of modifications and additions until each order would become a special job. A leading milling machine manufacturer told me that, some years ago, his company attempted to develop a market for a simplified miller of advanced design to serve the general purpose field, but soon found that every other buyer demanded that special features of one sort or another be added. As a result, the manufacturer concluded that the best thing to do was to drop the simplified design and put *all* of the high production features in the original package.

It seems to me that they adopted the wrong solution. *Had they stuck to their convictions but offered the potential customer two types of machine—one for general purpose use, and the other for the more exacting needs of high production, they could have grasped both horns of their dilemma.* With two different models, the needs of both markets would have been met without the necessity for making costly modifications of the one, or charging for the unneeded complexities of the other.

Perhaps the best evidence of the fact that there is a big potential demand for soundly built high grade general purpose machine tools in simplified designs which can be sold at a reasonably low price is that the few manufacturers here and there who have designed and built such machines are doing a land-office business. I am not talking terms of "cellar workshop" tools, either. Machines of the type I describe are being snapped up eagerly by a broad cross-section of American industry, large and small. One manufacturer of milling machines of this type was quoting, at last reports, two year's delivery. His product possesses the accuracy requisite for tool room use, feeds and speeds which are adequate for a wide range of light manufacturing operations, and it sells for less than half of the average of the "standard" models of light milling machines. There is a wide open field for comparable machines for turning, grinding and boring operations, and perhaps a host of others.

Must we wait until this demand is met in our domestic market by a flood of low-cost foreign-built machine tools? The latter are already offered here at prices below the U. S. average. Or will the U. S. machine tool industry rise to the occasion as it should? The opportunity is here. Let us grasp it before it is too late.



Increase Production Through Proper Application of Portable Power Tools

By Terence F. Dundon*

IN order to justify the use of any power tool, we must first establish whether we can afford to do without it on the operation we have in mind. Whether or not to mechanize can often be the difference between making more money or merely surviving. The very fact that the American standard of living under the free enterprise system has made human muscle a costly energy is reason enough to examine very closely every operation into which we are putting such energy. It is, therefore, not a question of working harder but of getting the work accomplished in a shorter period of time. This problem is not peculiar to the air conditioning industry or Carrier, but to all people engaged in manufacturing, whether it be a pin or a locomotive. In order not only to keep pace with increasing labor costs, but to produce a better product at the lowest possible cost, we in industry must explore every avenue of possible cost reduction. This makes manufacturing sense and is one reason why our economy can support such a high standard of living. In times of peace this means more air conditioning equipment, automobiles, washing machines, television sets, and electrical appliances used in every-day life. In times of war this means more tanks, ships, planes, guided missiles, and weapons.

At this point you may think I am overemphasizing the importance of the power tool industry, but from my experience not enough importance has been attached to the great time and money saving that can be achieved by the correct application of power tools. Naturally enough, the misapplication of any tool can be costly. This applies to all types of machine tools. I therefore suggest that if you have not yet made a comprehensive study of your power tool needs, you use the technical service and wealth of knowledge made available by the leading power tool manufacturers which we often ignore because it seems that in many instances we consider power tools a necessary evil.

Air, electric, and high cycle power tools all have their place in manufacturing and in the home as a cost reducing medium. Each, however, is not complete within itself. In our Maintenance Department electrical tools are predominantly used. This is understandable since air is not available in many places where Maintenance has to work. On the other hand, there are many operations on which air tools are used.

To give you some idea of the important part power tools play in the Carrier Corporation, the following figures are provided: Centrifugal Department, 354 power tools; Axial Compressor, 852; Reciprocating Compressor, 194; Tool Room, 89; Maintenance, 87; UED Assembly, 863; Press Shop, 11; Large Industrial Units, 261; Special Order Shop, 41; Allied Products, 217; Aerofin, 73; Field Repair Shop, 33; and Tank

* Superintendent, Perishable Tools and Supplies, Machinery and Systems Division, Carrier Corp., Syracuse, N. Y.

Illustration showing some of the different types of electrical and air tools currently available to industry.

Hull, 430, making a total of 3,505 power tools used.

The above figures include all types of both electric and air tools such as nut setters, drills, impact wrenches, grinders, sanders, screw drivers, buffers, saws, hammers, weld chippers, and air tools which we use to dress our spot welding electrodes, thus saving money by cutting the down time of our spot welding equipment to a minimum. Carrier Corporation's approximate investment in all types of power tools, including electric, is $875,000.

We must, however, not lose sight of the fact that the true cost of power tooling does not end at the initial cost. When you first purchase power tools it is essential, if you intend to run them economically and get all you possibly can out of them, that you maintain not only a control, but a preventative maintenance program. The extent of this program will rely upon your initial investment. We at Carrier Corporation have found it economically wise to go beyond not only the preventative maintenance program but the application as well. True, we use the technical service available, but we also have trained men who are able, through practical experience, to go out onto the job and see that not only is the tool large enough for the operation, but all pertinent items which have a final bearing upon performance are in order. In the case of air power tools, we watch for correct hose size, length of hose, air pressure, general application, and that vitally important subject, lubrication. In the case of electrical tools, the situation widely exists that, although we give serious thought to capacity when we purchase machine tools, there is a definite tendency to purchase light duty electric tools and then use them on heavy jobs. This, naturally enough, results in a high maintenance cost which is not a reflection on power tool cost, but on incorrect application. I would venture to say that the whole essence of the economical use of power tools is based on correct application and maintenance.

Considerable thought should be given also to the releasing of machine tools onto other more vital jobs by the application of power tools. For example, while we were engaged in the machining of the M-47 tank hull we found it necessary to use a large radial drill. The tank hull was picked up by crane and located on a large fixture. The arm of the drill came over and we drilled through a fixture. After this operation was completed, the fixture was removed and the tank picked up and put down onto the floor for further detail work. During those particular times it was most difficult to obtain machine tools and considerable thought was given to how we could get this operation completed without tying up the radial drill press and involving a great deal of handling costs. We finally licked this operation by designing a number of clamps, in which we mounted the air tool; and we were able to do most of our drilling, countersinking, and back spot facing by the application of air tools as a floor operation, thus relieving costly equipment for other vital operations. The handling cost alone which we eliminated on this operation paid for the necessary tools needed for the job. Here again is a question of bringing the work to the tool or the tool to the work.

In Department "A" by using power stud drivers there has been a 70 per cent reduction in time by comparing active and inactive studies—previous 19.80 minutes using wrench, present 5.72 minutes using stud driver. In Department "B" with the added use of air guns we find a 73 per cent reduction in time on an assembly operation. Other power tool operations show a reduction in time ranging anywhere from 15 to 61 per cent. All of these proven reductions in time are due to the use of air guns for stud driving on assembly jobs. In many instances a number of time consuming operations like those I have just outlined can be eliminated.

The enormous part that power tools played in our aviation program is self-evident if you have ever vis-

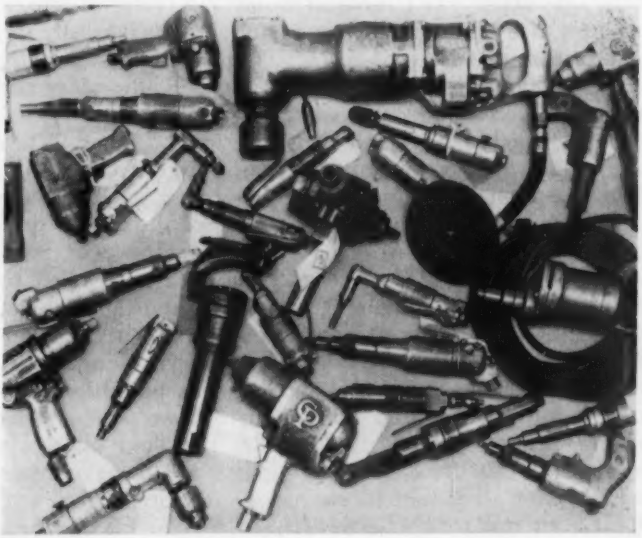
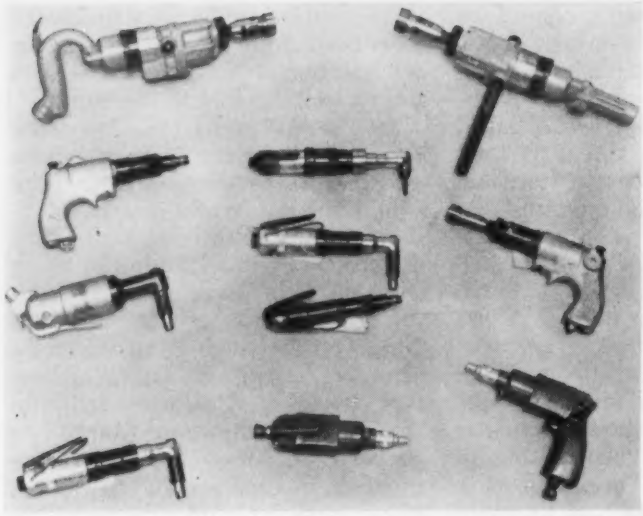


Illustration showing a typical assortment of air tools now widely in use.



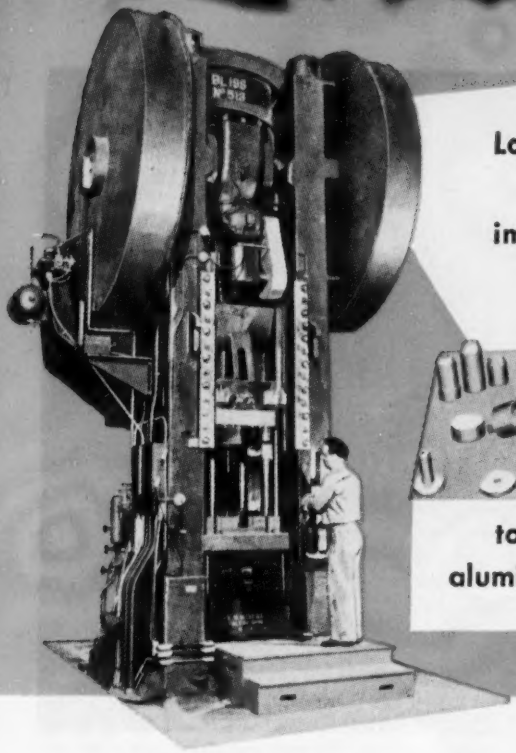
Another assortment of modern air tools designed for various operations.

ited one of the aircraft plants and seen operation after operation being done by either air or electric power tools—in many instances getting into places where it would be virtually impossible to get into with any other type of tooling.

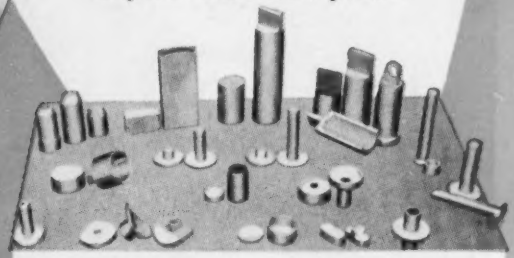
In one other job I have in mind we now use an impact wrench for an operation that was previously done by hand. At an investment of approximately $520, which gave us two air machines, thereby making sure that we had constant production when one machine needed repair, our savings amounted to 3,000 minutes per month, or 36,000 minutes over a period of a year. This roughly gives us 600 hours, or 150 weeks, figuring 40 hours per week. In order to talk "shop" language and at the same time bring out the cost factor, I have used, when comparing cost, not the actual dollars and cents, but the element of time, which after all is basically what we figure our dollars and cents from.

The wide assortments of power tools which the manufacturers have made available to industry are so flexible that we should be constantly alerted to new money-saving applications and should make power tools a part of cost reducing programs in all manufacturing plants. The rapid strides which the power tool industry has made in improving their products by reduction of size and weight—all important factors when using power tools for manufacturing in view of workers' fatigue—has made it vitally important from a cost reduction standpoint that we take full advantage and use wherever possible power tools in place of costly hand labor. Whether to use electric, high cycle, or air tools could be determined by a comprehensive study of the needs by yourself and service engineers of the power tool industry.

I have tried to present this very important subject of portable power tools in relation to our manufacturing cost in as simple a manner as possible. I contend that the answer is as simple as this: Can you in your manufacturing setup afford not to take advantage of the application of power tools as a cost-reducing medium?



Lockheed relies on this BLISS 1000 TON impact extrusion press



to produce high-strength aluminum alloy parts like these

and saves thousands over conventional machining methods

This press, largest of its kind in the aircraft industry, has saved Lockheed up to 75% in time as compared to machining, and up to 90% in material.

In fact, Lockheed engineers estimate that transfer of only 15 parts from conventional machining to impact extrusion will mean savings of $52,000 a year.

Lockheed's experience proves the importance of picking the right press for the job. And we honestly believe that our engineers are best equipped to help you make that choice. In representing Bliss—who makes more types and sizes of mechanical and hydraulic presses than any other company—they represent the world's largest press builder. Unparalleled skills and experience stand behind each Bliss press recommendation.

If you have a press problem—from a single press to an entire press room—consult a Bliss engineer or write directly to address below.

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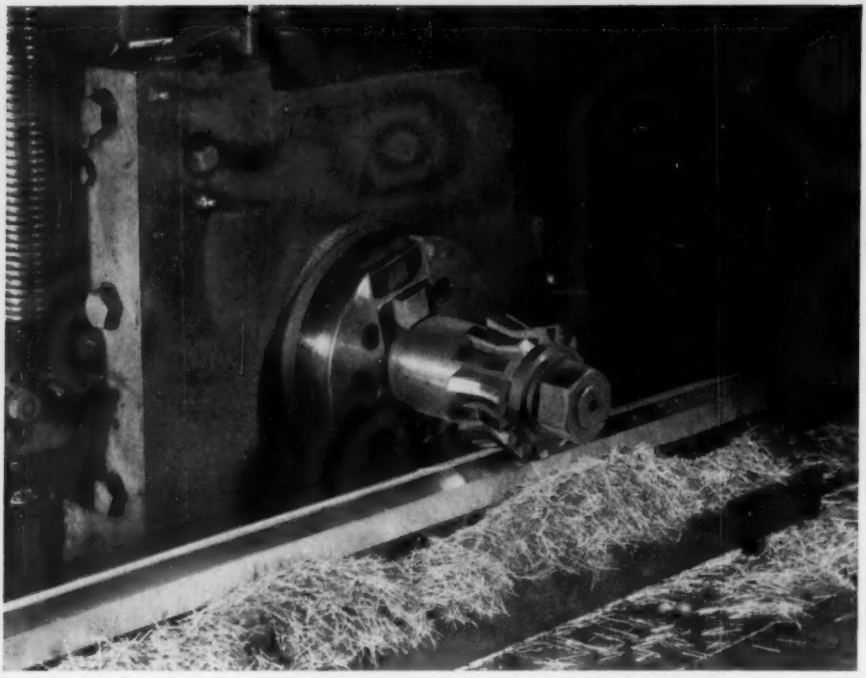

SPECIAL FORM CUTTER DESIGN

Reduces Set-Up Time, Eliminates Hand-Scraping

CUTTERS MILL WAYS 7-FEET LONG

These double-angle form cutters are used to mill conveyor-ways 7 feet long for production-type woodworking machines. They machine the surface of these ways accurately to eliminate the need for hand scraping. They replace previous gang-type cutters which required special care in sharpening, as well as additional set-up and adjustments on the milling machine in order to produce the desired accuracy.

ACCURACY AND FINE FINISH

The accuracy of the form on these ways is built into the cutter. The form on this ground cutter must fit the layout within .0005". By simply sharpening the cutter accurately across the faces of the teeth, this accuracy can be maintained throughout the life of the cutter. The only adjustment required in setting up the machine is to true the cutter on the arbor. The cutter is designed with fourteen teeth on a 4" diameter to provide the fine finish required on these ways.

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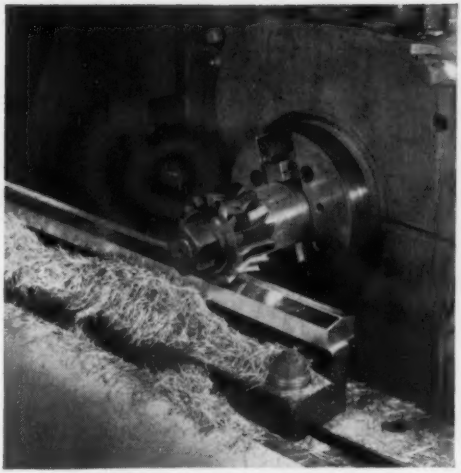
Material is special bronze and there is some irregularity in toughness. Tool life up to 30 pieces per sharpening is obtained at 3/8" feed and 150 RPM, depending upon the consistency of the material. Milling removes .008" stock.



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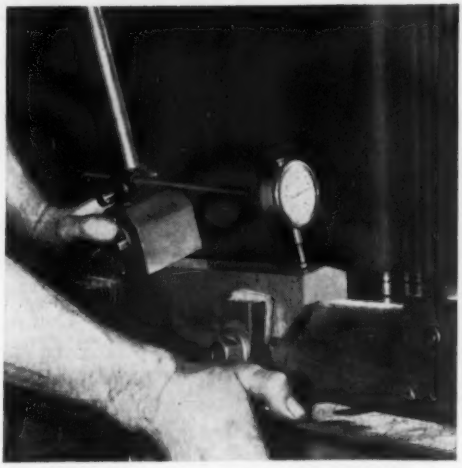

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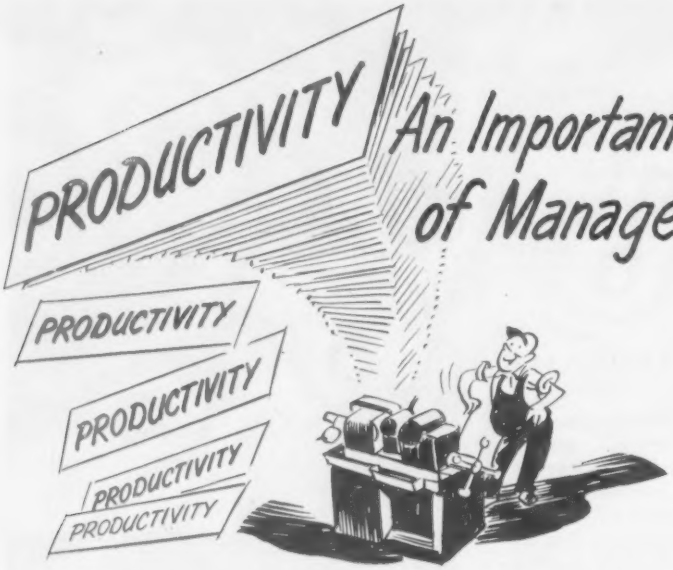
PRODUCTIVITY An Important Function of Management



The trend of productivity should be a road map for management policy and action.

By JOHN W. ROBERTS
Vice President, Albert Ramond & Associates, Inc.

PRODUCTIVITY measurement is a useful but often neglected tool of modern management. When properly employed, it measures the combined effect of technological changes, labor utilization and equipment utilization. When comparisons are made with similar activities elsewhere, or with prior periods, they often disclose sources of improvement or indicate competitive position. The trend of productivity should be a guide to the investor and a road map for management policy and action.

Productivity should be of increasing concern to us in America because there has come a noticeable change in trend in our better managed plants and industries. *Frankly, we have not been able to realize in recent years the anticipated and traditional improvements in productivity that have fully justified the huge expenditures mades for facili-*

ties and equipment. This seriously affects our *prior concepts,* our *planning,* our *policies* and our *action.*

As consultants, we have dealt professionally with the subject of productivity for 37 years. During this rich and privileged experience there was opportunity to observe and study many formal and informal organizational plans. Some of these were expressed in multicolor prints and prominently displayed in the office of the chief executive; others were of the plain black and white variety and also convenient for observation. There were others that were strictly mental patterns and you needed conversation to grasp the basic approach and the philosophy of management which was used under these circumstances. Usually the plans were accompanied by detailed descriptions showing the functions, line of responsibility, the basis for the evaluation of performance, relationship with others, and other important aspects of the job or occupation. I have observed and studied many of those plans and have yet to find one that sets out a real important function of management—that is productivity — in its proper place in the organization lineup. It would seem prudent, in light of the important place which productivity has always occupied in our economy, for someone to have created a responsible new job reporting directly to the President, such as Vice President in Charge of Productivity, or Director of Productivity Improvement. What a job that would be! What an opportunity! What a challenge!

I can imagine the individual, shortly after having this type of appointment dumped in his lap, sitting in some quiet spot, the controller's office for instance, wondering how to attack and approach the project. And it would require some deep thought. His thinking would probably be along these lines: 1. Just what is productivity anyway? 2. What has been the trend of our actual experience? What should be our maximum expectations? 3. What can be done without great capital expenditures, and with capital expenditures to improve our productivity? Are expenditures justified? 4. How

▲

". . . we have not been able to realize improvement in productivity . . ."

can I wrap up the package so that attitude of our employees will be enthusiastic about accepting technological changes that increase productivity? How can we conduct our negotiations so that channels will be kept open for technological improvements and the resulting benefits that will accrue from this source? and 5. What are the benefits of improved productivity? How, and to whom, should these benefits be distributed?

There are probably a hundred other questions he would ask, but let us consider for a few moments the above: they are provocative and controversial.

1. What is productivity?

The dictionary defines productivity as the quality of being productive, so you can see we aren't going to get much from that. Most executives view it as "the standard man hours of work produced per actual man hour worked," but this appears to me as being an index of labor utilization rather than of productivity. Some years ago I proposed the following formula to a company that had a wide mixture of products and wanted to get a fairly reliable index of its productivity from year to year.

Productivity Index = Production
X Mix Factor
X Labor Utilization
X Equipment Utilization
X Technological Development Ratio
X Customer Acceptance Factor
÷ Man Hours for the Period Selected

$$PI = \frac{P \times MF \times LU \times EU \times TDR \times CAF}{\text{Man Hours}}$$

This, you can see, gets quite complicated and is an apt subject for

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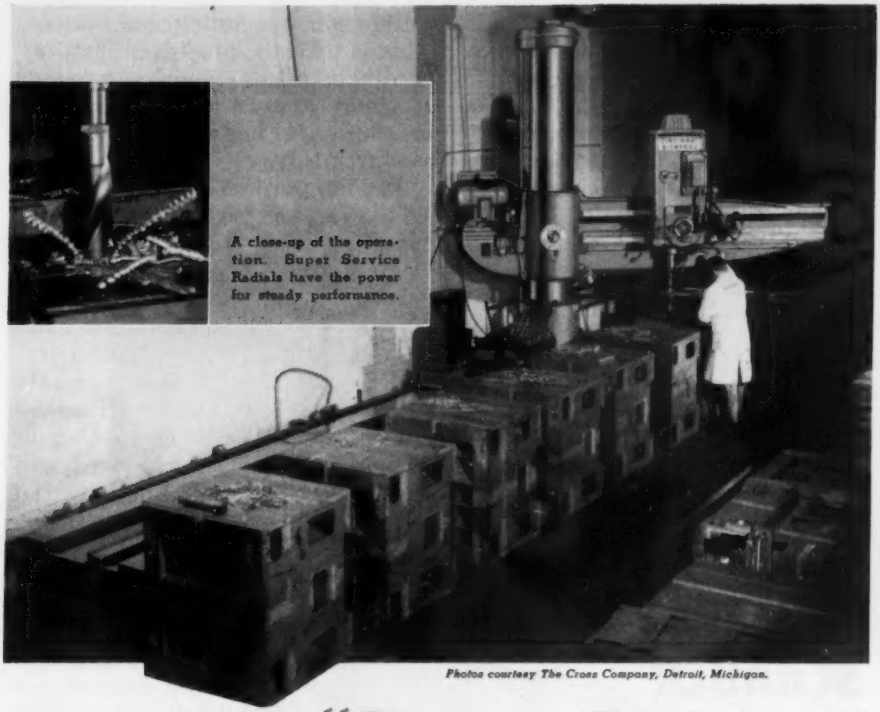

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a traveling "Super Service" does this LARGE AREA JOB . . .

Here at The Cross Company ten Cincinnati Bickford Super Service Radial Drills are at work . . . On this job, the traveling Radial with sliding base, saves time and gives high production with necessary accuracy. In each of the 7 bases handled here there are 20 holes drilled and tapped and one 3" diameter bored and chamfered. The Cross Company say these drilling machines "bring easy handling, dependability and durability."

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study in each individual company. Several things are certain, however. One is that we need a good, simple and understandable definition of productivity. Secondly, we know definitely that when management does not have the ability, or when it does not have the opportunity to manage, that productivity consistently fails to improve from year to year in line with the anticipated pattern. This is a costly procedure and, accordingly, *taking the necessary steps to insure increasing productivity is a definite and important function of management.*

For the purpose of our discussion let us assume that productivity is "the equivalent production per man hour worked."

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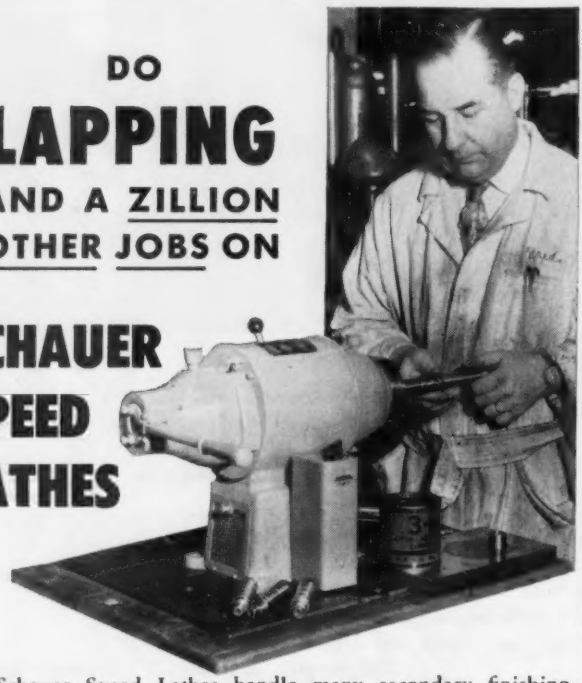

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2. What is the productivity trend?

Economists have estimated that the traditional increase in productivity in American industry will vary between a 3 per cent and 5 per cent increase per year. This amazing record has been the result of several interesting factors, not the least of which has been the willingness of stockholders and Boards of Directors to let those who are in charge of management do the managing. Contrast this with the usual management of European companies where a Board of Directors takes the

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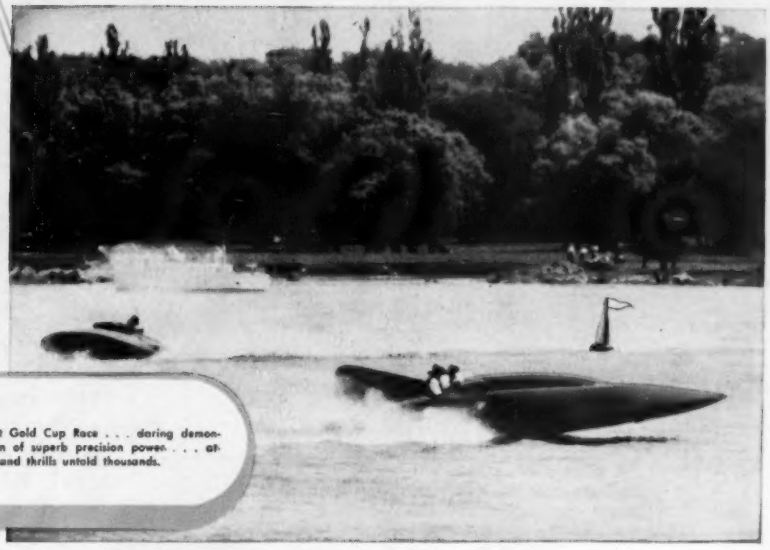

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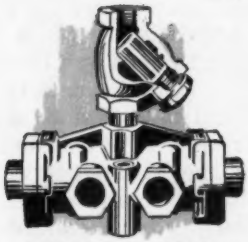

Model 6245—4-Way, 2-Position

Model 6540
4-Way, 2-Position

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SAVES TIME Logan AIR AND HYDRAULIC EQUIPMENT EFFORT-MOTION

LOGANSPORT MACHINE CO., INC., 801 CENTER AVE., LOGANSPORT, IND.

Year	Productivity Tons Shipped Per 1000 Man Hours	Labor Utilization in % (Actual)	Equipment Utilization in % (Estimated)	Wages Base Labor Per Hour	Average Man Hours Per Tons Shipped
	1	2	3	4	
1933•	41	81	90	.375	24
34	48	88	92	.475	21
35	53	93	94	.475	19
36	58	98	100	.525	17
37	50	102	100	.625	20
38	61	100	100	.625	17
39	70	102	100	.625	14
40	78	103	100	.625	13
41	93	102	100	.725	11
42	80	100	100	.790	13
43•	76	102	100	.790	13
44	81	102	100	.790	12
45	85	100	100	.790	12
46	92	98	100	.960	11
47	97	98	100	1.140	10
48•	98	98	100	1.240	10
49	111	96	100	1.240	9
50	125	97	100	1.370	8
51	137	96	100	1.370	7
52	139	98	100	1.490	7

Fig. 1 — Compilation of productivity, labor utilization, and wage relationship figures over 20-year period obtained from modern, up-to-date plant in metal manufacturing field.

SUMMARY

Item	20 Years 1933-1952	10 Years 1943-1952	5 Years 1948-1952	1 Year 1951-1952
1. Productivity	240%	83%	42%	1%
2. Labor Utilization	23%	—4%	0%	2%
3. Equip. Utilization	11%	0%	0%	0%
4. Wages	296%	89%	20%	9%

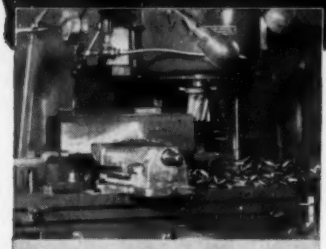
responsibility for management, and you see why our productivity has advanced much more rapidly than it has on the other side of the Atlantic. Another reason has been the willingness of the American investor to plow the profits back into the business, using it for new equipment, research, better working conditions and the myriad of things that make for expanded production and lower costs.

It has been estimated that at the start of the year 1946 the capital plant investment in the United States was approximately one hundred and fifty billion dollars. It has been further estimated that between the period of 1946 and through the period of 1953 one hundred seventy-five billion dollars will be expended for capital plant expansion. This added expenditure you can readily see is greater than the entire value of only eight years ago. It is certainly indicative of the willingness of investors to plow the profits and their money back into expanded facilities.

Because capital expenditures greatly influence the rate of productivity increase, these investors had a right to expect a greater than normal increase in the average productivity trend. Estimates were made

A new twist in milling cutter design...

removes metal 3 to 10 times faster!
gives finishes of 20 rms and better!



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A 3" "Helicarb" straight shank end mill on a 50 h.p. mill removed 61½ cubic inches of 2340 nickel alloy steel (Rockwell C28) per minute! Spindle speed 416 r.p.m.; table speed 19" per minute; cut depth 1-5/32".

The new Sonnet Helicarb Milling Cutters combine the edge hardness of one-piece carbide tips with the proven principle of a true helix flute design. Result? A rugged, heavy duty cutter unmatched for stock removal and efficiency!

The constant included cutting angle of the "Helicarb" cutter distributes the cutting load uniformly over the full length of the cutting edge. Under proper conditions, this unique shearing cutting action reduces impact and gives 3 to 10 times greater production than possible with helical flute high speed steel, or straight tooth, carbide-tipped cutters. Uniform chip load and proper chip flow result in longer cutter and carbide life, less chatter, minimum chip recutting and smoother finishes—*20 rms and better on actual production jobs!*

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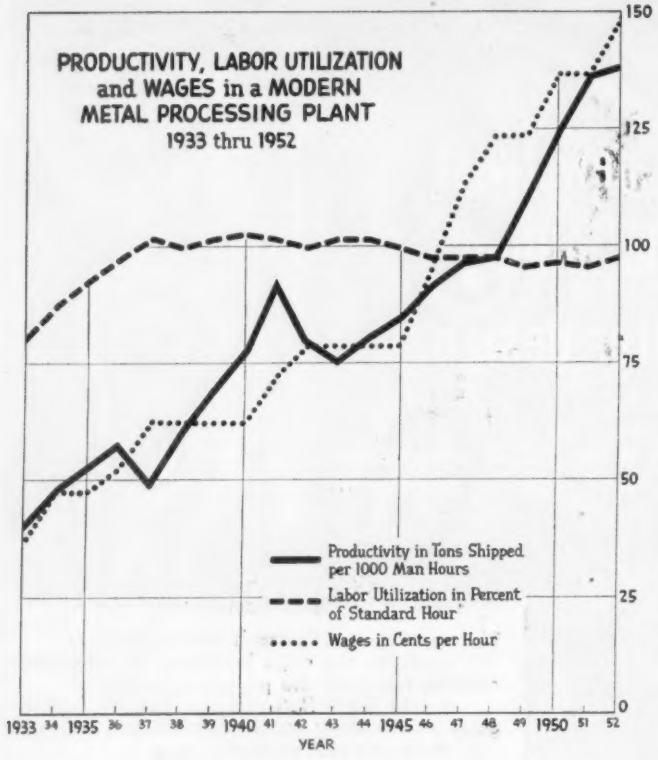

Fig. 2—Graph showing curves plotted for productivity, labor utilization, and wages in a modern metal processing plant for the years 1933 thru 1952.

indicating that productivity would increase, as the result of these expenditures, between 40 per cent and 50 per cent during this eight year period. Reliable estimates now place the actual increase at less than half of this amount.

In casting about for a good example of this type of trend, I thought it would be well to take a modern up-to-date plant in the metal producing industry, which had good management, where profits had been put back into the business, where every modern tool and control we know of had been used to increase productivity and to reduce operating costs over an extended period of time and where the mix of production was fairly consistent.

Accordingly, a visit was paid to a client of our company whose background and activity seemed to fit the above provisions. A review of the figures and charts which were compiled, as a result of this visit, is extremely interesting. The mix of production was on the favorable side since this company measures productivity in terms of "tons of finished product per 1000 man hours" and there has been some increase in the proportion of semi-finished products brought from elsewhere for final processing. These are amazing figures, and are probably quite representative of many well managed plants and similar to those represented by you people here today.

The attached compilation, Fig. 1, and the Chart, Fig. 2, show the productivity, labor utilization, and accompanying wage relationship for a period of 20 years, extending from 1933 through 1952.

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NEW DI-ACRO* PRESS BRAKE

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New Di-Acro Press Brake forms 16 gauge mild sheet steel across the full 24" forming width, 10 gauge mild sheet steel across a 12" width as well as inconel, brass, aluminum, stainless steel, chrome molybdenum and other ductile materials. Available with standard dies and specials—both are interchangeable with other press brakes.

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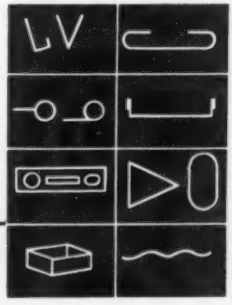

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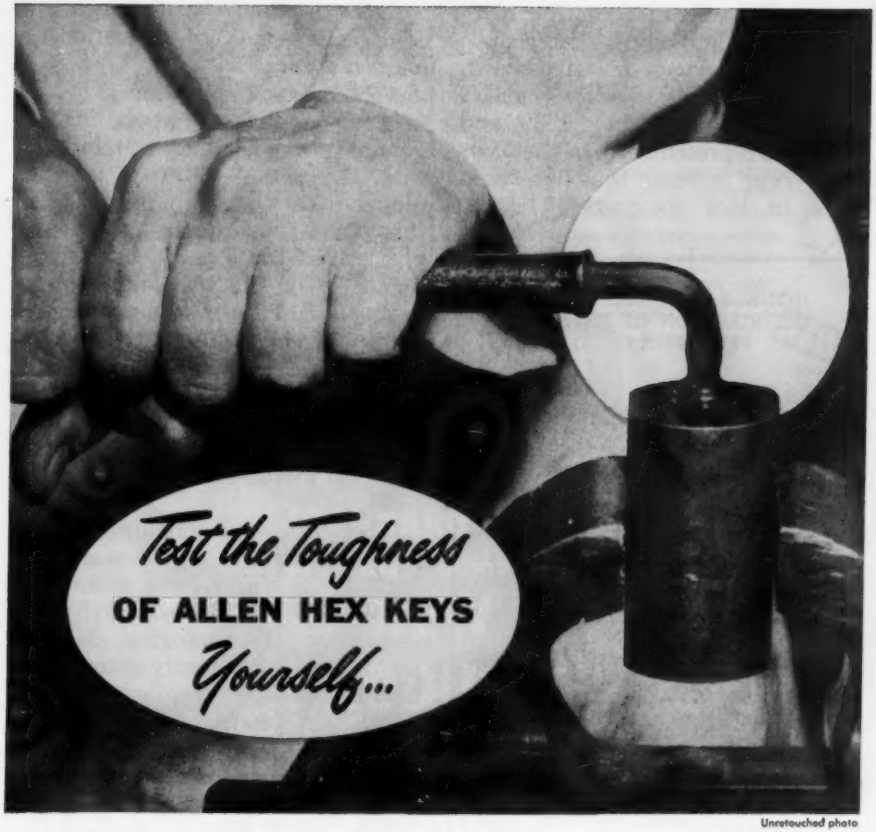
The increase in productivity has been 240 per cent in this span of time. This is an average increase of 12 per cent per year over the original 1933 figure, or an average of between 6 per cent and 7 per cent increase from one year to another. You will also note in the summary that the trend of increase in recent years has become alarmingly low, and for the last year shown was only 1 per cent over the previous year. Over this span of time there was a substantial increase in the assets per employee for equipment expenditures and for research to make this increase in productivity possible. Production was found to have increased threefold.

During this same 20 year period labor utilization increased a total of 23 per cent (1+ per cent per year). In recent years the trend has been slightly downward and below the higher figures that were realized in the early 40's. This we find to be a fairly normal trend in well managed industry, due primarily to the heavy influx of new employees during the tight labor market of recent years and concessions made during recent collective bargaining negotiations such as pay for the time not worked, and so on.

The figures on equipment utilization, which were estimated, indicate that the increase over the 20 year span has been very small and practically static for the past ten years. In practically all instances, output from this same equipment has been substantially increased due to technological and other improvements, but the utilization of the resulting equipment provided has remained constant and at a very high level, indicating a fine attitude on the part



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To prove to yourself how tough Allen heat treated keys really are, slip a section of pipe over an Allen hex key that has already tightened a socket set screw to the maximum recommended. Twist the key around its axis a full 90° — IT STILL WON'T BREAK! When the Allenoy steel key finally does shear, the break will be smooth. No splinters, no jagged edges to cause injury.

• • •

For the toughest drive key made, get Allen Hex Keys, size-marked for convenience in all sizes above $\frac{1}{16}$".

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ALLEN HEAD

of all employees in accepting revolutionary technological changes.

Regarding wages, we have shown the *base labor rate* (Labor Grade 1) that has been paid since 1933, and it is quite representative of the *overall average increase* that has taken place in this company. The increase has been more than the increase in productivity, and amounts to 296 per cent—15 per cent average per year—over 1933. You will also note that the increase in wages has remained quite steady and in line with the productivity increase, while equipment and labor utilization remained static.

HOURLY PAID EMPLOYEES
DISTRIBUTION OF EXPENSE
PER HOUR (1953)

Direct		
Base Rate (Ave. all Hourly Paid Employees)	$1.915	
Incentive Earnings (Ave. all Hourly Paid Employees)	.300	
Shift Differential	.038	
Overtime	.120	
Holidays	.048	
Vacation	.100	
Christmas	.006	
Total Taxable Income		$2.527
Fringe		
Pensions	.127	
Insurance	.032	
Unemployment	.014	
Fed. Old Age Benefits	.029	
Workman's Compensation	.016	
Total Fringes		$ .218
Total Cost Per Hour — $2.745		
(Average *all* Hourly Paid Employes)		

Fig. 3—Breakdown showing distribution of expense for hourly paid employees during the year 1953.

To show how important it is that we keep productivity at the highest possible level, let me acquaint you with the actual expense per employee hour (hourly paid only) in this same company. In 1953, it approximated $2.75 per hour. This is made up of the base rate, which averages $1.95 per hour, incentive earnings, shift differentials, overtime, and the added expense of fringe benefits (See Fig. 3). If there is a noticeable downward trend in productivity, production costs are going to increase with alarming rapidity.

There are some conclusions to be drawn from the experience catalogued: a. Wages have more than kept pace with productivity increases; b. Technological developments were consistently absorbed by a willing group of employees; the attitude was good; the way was well prepared by capable management; c. Productivity is influenced by many factors other than labor utilization; and d. *With productivity going up less rapidly than wages, production costs are undoubtedly rising.* Higher selling prices are in order, or profits are going to be jeopardized. This can be descriptively termed in modern parlance as "Operation Nutcracker."

If this trend continues, a serious question arises. Will investors provide adequate capital for research, better tools, and equipment?

3. What can be done to improve productivity?

In September, 1952, the NAM published a pamphlet entitled, "Pro-

NEW!

PARALLOC Dial Snap Gages "D" (Direct) TYPE

Introducing a new type of pin locking mechanism which maintains constant parallelism between anvil faces.

8 SIZES, each with 1" range, cover over-all range 0" to 8"

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PARALLOC Dial Snap Gages "L" (Lever) TYPE

Fully encased movement and indicator protected against damage. Set-back indicator and handle permit entry into narrow recesses. Wide choice of indicators.

8 SIZES, each with ½" range, cover over-all range 0" to 4"

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NEW!

Dializers®

STANDARD's original device for converting AGD Adjustable Limit Snap Gages to *DIAL* Snap Gages now available with wide range of indicators from 1⅛" to 2¼" diameter, graduations of .001", .0001", .0005" and .00025", and a wide variety of dial markings, including metric.

Available separately for your frames or assembled in AGD frames supplied by us.

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STANDARD GAGE presents a number of

NEW PRODUCTS

each deliberately designed to help you do a better job

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Three new models extend dial bore gaging range by intermediate steps down to ⅛" diameter. Each utilizes STANDARD's new, highly practical CENTERING-SIZE DISC principle. Simple in design, easy to set, easy to use, but amazingly accurate and effective in small bore gaging.

STANDARD Dial Bore Gages now available in 10 sizes covering range from ⅛" to 24"

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We invite your investigation and trial of these new gages, each designed to help YOU.

STANDARD Gage Co., Inc.
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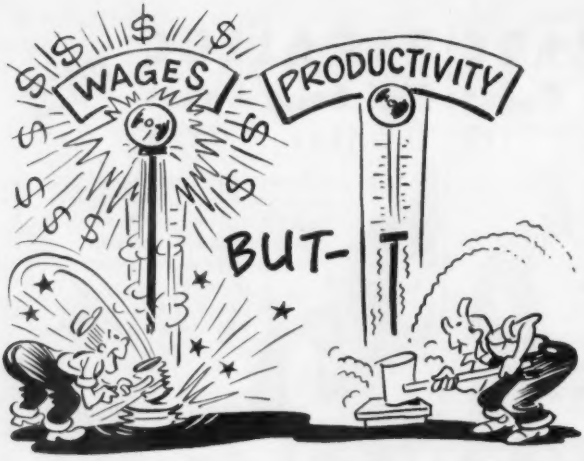
Write for brochure on "NEW PRODUCTS" for more complete details on these instruments.



". . . with productivity going up less rapidly than wages . . ."

ductivity," and listed on page 15 many factors that contribute to increased productivity. This pamphlet is required reading if you are interested further in this subject.

Also, the productivity team reports for various American industries, as published by the Anglo-American Council on Productivity, will give you a surprisingly good, comprehensive picture of the productivity in your industry in America, as well as in the British Empire. These are the reports of the industrial teams sent to America from the United Kingdom to study production methods and to make recommendations. You can get these from the Department of Commerce in Washington, D. C. In concluding this section, my advice is to *make it easy for responsible management to do the job of managing.*

4. How can we wrap up the package?

An important factor in improving productivity, as you well known, is the *constructive attitude of your employees toward technological developments.* When a company provides better facilities, tools, equipment and research, the attitude of the men who do the work must be such that they will use these improved tools to their fullest capacity. *There has been a tendency in some recent contract negotiations for union groups to oppose the installation of new and improved equipment.* This is not constructive, nor the real pattern of what union leaders or workers want in this connection. It is evident that workers realize that our high standard of living in America is based on mass production philosophies, and the attendant low profit per piece and low cost that goes with this pattern. Labor, however, does not want to be pushed around when developments of this nature take place. They feel, and rightly so, that an employee shall have a reasonable measure of protection when improvements are made. Some unions would like the area of technological change and development defined in detail with the protection afforded the employee spelled out under each condition. They want the area of human impact adequately cushioned when changes occur.

Other union groups aren't quite so specific, but state openly that when technological changes occur they want to negotiate regarding them

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applies special compound for tapping 100% thread in thin-wall aluminum tubing

increases output 35%
improves quality
eliminates hand operation

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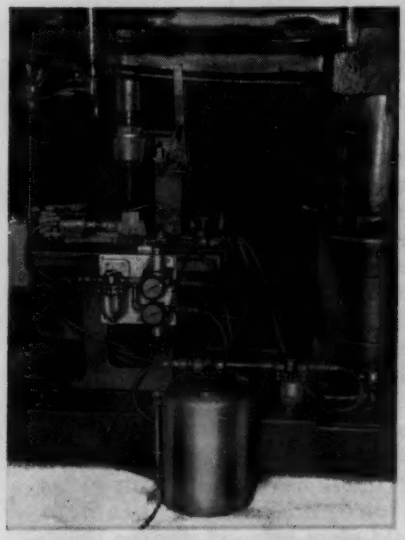

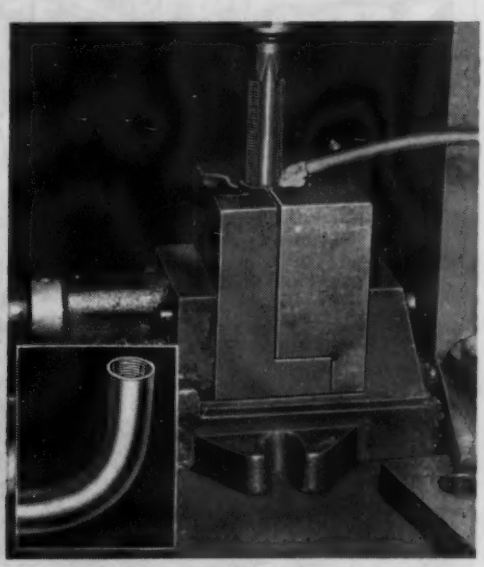

Norgren Spray-Lube System gives more efficient application of cutting oils for:

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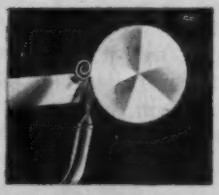
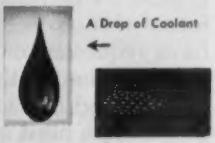


Coolant where you need it ... spray is applied to work area from any required direction to thoroughly lubricate critical contact areas between cutting tool and work piece.



Fine spray rapidly dissipates heat... the spray lubricates tool more efficiently; has greater exposed oil surface area for fast, thorough dissipation of heat.

VALVES FILTERS HOSE ASSEMBLIES REGULATORS LUBRICATORS

". . . a tendency . . . for union groups to oppose..."

and make the change as the result of mutual agreement.

You can see that some of these complications tend to restrict the activities of plant management, but wise management will give them adequate consideration in contract negotiations so that there will be no limit or restriction in technological developments. One of the saddest sights in industry is to see new work-saving equipment sit around in a research department for several years because negotiations for its installation can not be concluded, or after installation have a drastic slowdown result because agreement can not be reached regarding crew size or output.

The union position regarding wage incentives has come in for increased recognition. Some union groups flatly reject and oppose all forms of incentive payments. Others have requested or demanded active participation in the creation, development and application of incentive plans. How hard a man should work is fast becoming a social and economic bargain. In many companies, old incentive programs have been negotiated into submergence, or frozen, or made ineffective. Wage incentives have been a traditional and potent force in increasing labor utilization and, indirectly, productivity; and the above has resulted in a slowdown of improvement.

It should be realized that over the last twenty years much of the heavy effort or back breaking jobs have been eliminated from industry. We are not quite at the push-button stage today, but are gradually approaching it.

In light of all this, many managements will want to reappraise their prior philosophies and modernize them in accordance with the technological, social and economic changes. There is no single answer that will guarantee a wholesome attitude on the part of employees toward technological changes, but wisdom in appraising your conditions and your past relationships with employees, and recognition of the problem, should serve as good starting points for your negotiations and policies that will be acceptable to both management and labor. Unions are primarily interested in security for the mass of their membership; your job is to convince them that progress and opportunity will bring the greater reward.

Since 1940 we have been operating in a tight labor market. This

5346

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THE HANDY HAMILTON PORTABLE ELEVATING TABLE

One man can lift, lower, and transport compact, heavy loads which, without Portelvator, would require the combined strength of three or more men.

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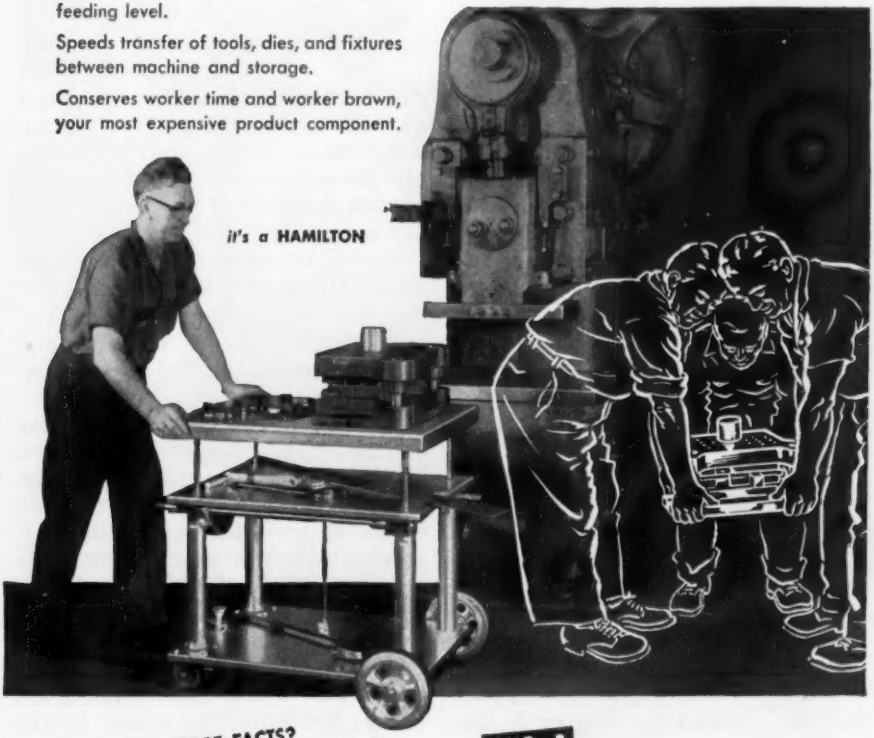

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828 South Ninth Street, Hamilton, Ohio

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". . . the chief benefactors have been labor . . ."

▼

means that much time was lost training and breaking in new employees, and doing such work as was necessary to keep old employees from quitting and going elsewhere. This has had a negative result on productivity during this period. If the labor market eases up in the near future, we can reasonably expect some improvement in productivity as the result of it.

5. How, and to whom, should the benefits of productivity be distributed?

In the NAM pamphlet issued on the subject of productivity, they took the position that benefits should go to the consumer in the form of lower prices.

In a statement regarding bargaining and productivity recently issued by the AFL, they took the position that all the benefits of improved productivity should go to labor in the form of higher wages.

Statements from various groups of the CIO indicate that they feel the large share of benefits from improved productivity should be passed on to labor individually and collectively.

You will notice in all of this that the investors are not getting much of a break. If the law of diminishing returns is beginning to take over and we are at the point where only modest returns in increased productivity can be anticipated, then we must give the investor greater consideration if he is going to continue to supply the money for research and improved facilities. The modest, doubly taxed, dividend check of prior years will not be an attractive proposition. *Up to now, the chief benefactors have been labor, in the form of higher wages, fringe benefits, and working conditions, and the consumer, in the form of minimum prices.*

It is quite probable that for the near future the benefits of improved productivity will continue to be distributed between labor and the consumer in accordance with the bargaining pressure which each party is able to successfully apply. Every management should continuously appraise the benefits being realized from increased productivity, and the manner in which these benefits are being distributed to labor, to the public and to the investor. There should be a balance in the distribution.

Some of these remarks have been optimistic; others point to a change

5407

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VARIABLE SPEED • SMALL HOLE
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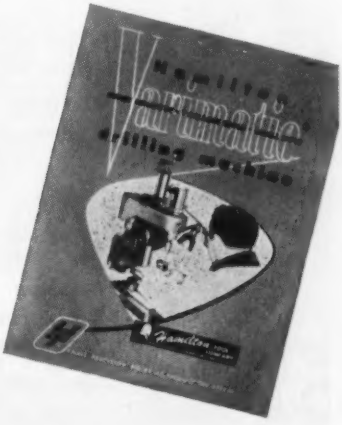
to drill holes (.004" to 5/16") in all drillable materials, to the most exacting specifications and on the most relentless production schedules.



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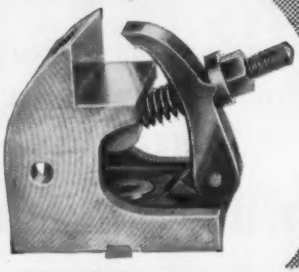
set-up time and the need for expensive jigs and fixtures



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"Masters of A Thousand Set-ups"

Many special set-ups can be handled with these inexpensive, versatile fixtures. Hold round, hexagonal, octagonal or square stock, aligning work with machine. Value proved for years in large and small shops.

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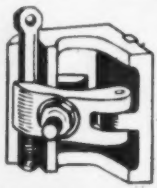

4 sizes hold stock from ½" to 4½". Any size holds smaller stock with shims.

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in trend which will require understanding, skill, imagination and courage on the part of management if they continue the traditional upward trend in productivity in the face of greater resistance and less flexibility. There is no ceiling on brains, and those that operate with imagination and intelligence during periods of change usually come out with a competitive advantage. One thing is sure: if all of us turn out the maximum for every hour we work, and keep the channels clear for continued technological changes, we will advance the high standard of living we have always enjoyed and retain the strength that will protect our peace and our freedom.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

"I know ya, Grogan! Trying to sneak home some more stock, eh?"

5409

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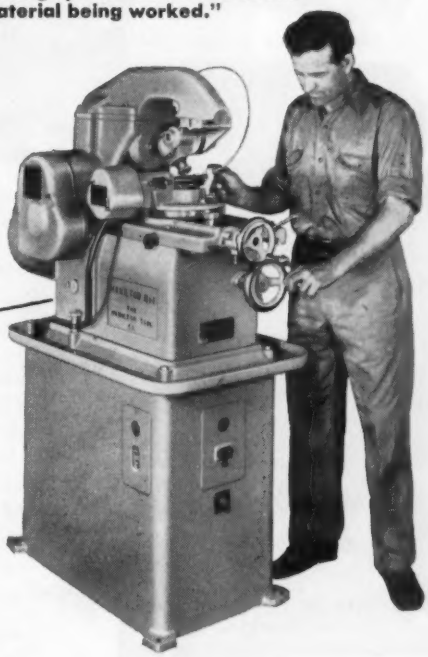
Short runs of small, fine pitch, precision gears (gears up to 6" O.D. of the gear blank) carry high unit costs largely because of the top-heavy machine set-up time as compared to total production time. You can beat the machine set-up problem by routing small precision gear jobs to Hamilton Precision Gear Hobbers . . . for:

"Hamilton Precision Gear Hobbers feature independent selection of speed, feed, and indexing; reducing machine set-up time and offering a selection of cutting speeds and feeds to suit (exactly) the material being worked."



if you buy small quantities of precision gears, tell the man to "put your job on a Hamilton." You stand to profit two ways!

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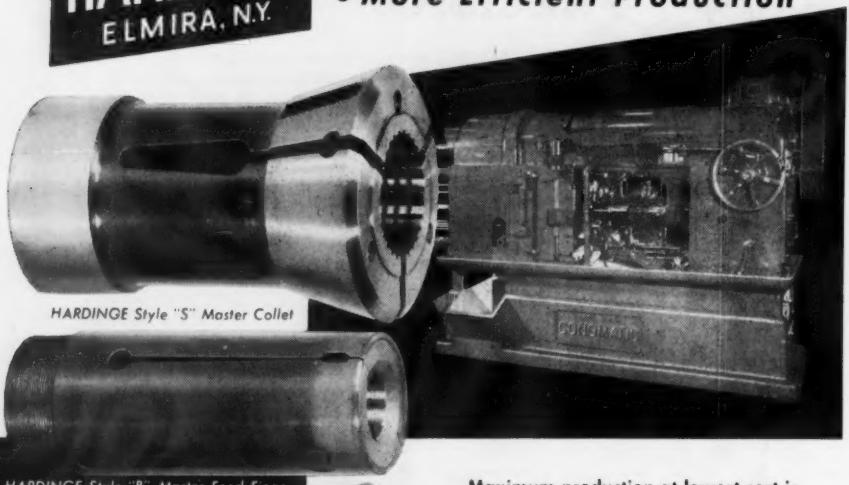

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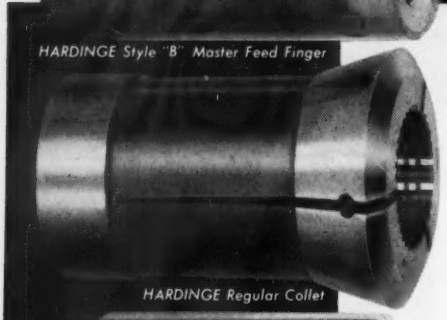

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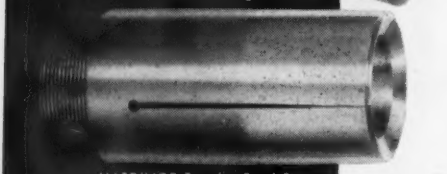

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Maximum production at lowest cost is assured when you specify HARDINGE Collets and Feed Fingers

Hardinge Master Collets and Master Feed Fingers feature low-cost replaceable pads that are interchangeable among different makes of automatics with the same capacity.

Hardinge Masters give true solid collet and feed finger performance.

Hardinge Regular Collets and Feed Fingers are precision made, hardened and ground internally and externally, and bring you the benefit of 62 years of engineering and manufacturing experience.

* *Also available for the following automatics: Greenlee, Gridley and Acme-Gridley, National Acme, New Britain*

Hardinge is your one source of supply for all collets and feed fingers.

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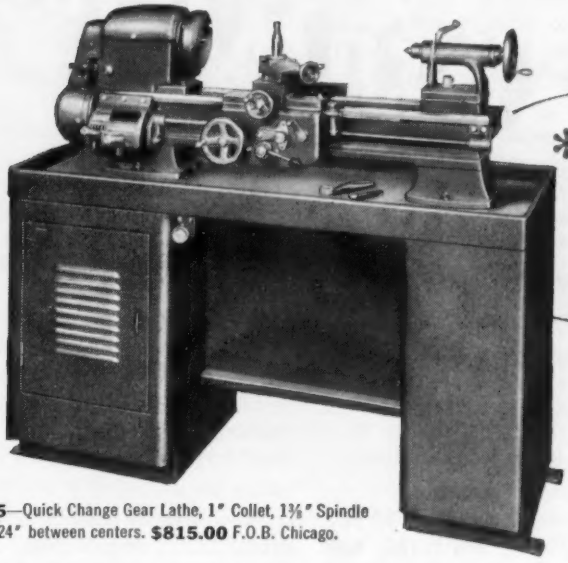
The Answer

To your metal turning cost problem may well be this 11″ Logan Lathe *



*One of the many in the complete Logan Line of 9″, 10″, 11″ and 12″ swing Lathes, and 8″ Shapers.

No. 1955—Quick Change Gear Lathe, 1″ Collet, 1⅜″ Spindle Hole, 24″ between centers. **$815.00** F.O.B. Chicago.

The cost of precision results drops sharply when you turn work on this 11″ swing Logan "1955". With 1″ collet capacity, 1⅜″ bore, and 24″ centers it takes pressure off costly-to-run, big lathes . . . with no difference in precision results.

Sustained accuracy and low cost performance are built into the "1955". The spindle revolves on preloaded ball bearings of extreme precision that need no adjustment for any speed from 45 to 1500 rpm. The rugged, balanced special alloy bed has two V-ways and two flat ways precision ground. The automatic apron, double-walled and friction-free, with spline-driven power cross feed, has a convenient, lever-operated, disc type clutch. The double V-belt drive transmits maximum power to the headstock. You will find the "1955" equally effective in production, shop and toolroom. Ask your Logan Lathe dealer for full facts.

Brief Facts

- Collet Capacity, 1″
- Spindle Hole, 1⅜″
- Swing over bed, 11⅛″
- Center Distance, 24″
- Bed Width, 6 15/16″
- Ball Bearing Spindle
- 16 Spindle Speeds, 45 to 1500 rpm
- Double V-belt Drive
- Threads—48 selections, RH or LH—4 to 224 per inch

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Logan ENGINEERING CO.

Lawrence and Lamon Avenues, Chicago 30, Illinois

LOOK TO Logan FOR BETTER LATHES AND SHAPERS

Common Sense AUTOMATION

The anatomy of the many sided, complex and frequently misunderstood term "automation" is described.

By W. B. SHIMER
Master Mechanic, DeSoto Division, Chrysler Corporation

AUTOMATION, the magic word of the new industrial age, is many sided, complex, and probably misunderstood. To define it is difficult. It will be useful here to describe its anatomy. Automation is made up of integrated automatic machines and means for conveying parts between these machines. The goals of automation are reduction of manual labor and production of precision parts in very large volumes, to reduce costs in all phases of product manufacture. Automation has made wonderful inroads, but there are also blind alleys in this, as in other new production concepts. Industry should look carefully before they are caught up by this industrial magic. They should keep in mind at all times the goals of automation and, above all, season their decisions with good common sense. *One of the most important decisions industry must make concerns the general type of automation to be used.*

One example of automation is the rotary index machine, by no means a newcomer. If one can judge by the number of these machines now in use, it can be said that they are well accepted components in overall automation schemes. Yet index machines are uncommonly expensive to build and service. In their various types—trunnion, chucking and carrousel — the original cost is often

equal to the cost of the labor they replace. Movement of parts to and from index machines often calls for complicated mechanisms not dissimilar to those in Rube Goldberg cartoons. And, because of the cost of the unusual components required to permit the index machine to perform its magic, they are usually difficult and costly to maintain.

In the DeSoto Fire Dome V-8 Engine Plant, straight-line transfer type machines are used in preference to the index type. The most successful straight-line transfer machines in use in the plant consist of a series of single-purpose automatic machines connected by rails. In principle, these machines are a series of individual drill press and milling machines with rails for sliding parts from one machine to another by a pusher or transfer bar. The feed mechanisms are self-contained within each unit. And, no close accuracy is required between units.

The best example of unitized transfer automation in the plant consists of 13 machines used to machine the DeSoto V-8 cylinder block. The largest component in this group has 18 unitized machining stations, and performs a total of 180 operations. In all, there are 702 operations completed in this cylinder block line, an average of 54 operations in each transfer machine. Operations include milling, drilling, reaming, boring, honing and assembly of welch plugs. The closest tolerances held are 0.0005 inch on five in-line bores for crankshaft bearings. These are held to an alignment tolerance of 0.0005 inch without further attention.

The labor cost on this cylinder block is approximately two-thirds less than it would be if rotary index type machines were used. The number of skilled workers required, such as tool setters, electricians, machine repairmen and tool makers remains the same. And, although overhead ratio of skilled workers to productive workers has increased, there is no actual increase in maintenance cost.

These unitized transfer machines are "common sense" automation that has many advantages, including reduction of part cost; high productivity; reduction of physical labor; uniform quality of production; mini-

"One of the most important decisions industry must make concerns the general type of automation to be used."

mum scrap of production parts; minimum breakage of tools; maximum life of tools; good safety features for machines and operators; excellent plant layout for orderly arrangement, minimum space; and automatic chip disposal.

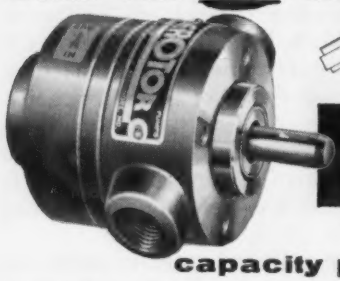
Straight-line transfers are the most satisfactory form of machining automation, and are the simplest to integrate into an overall scheme. For parts requiring more than one transfer machine, it is only necessary to extend the transfer bar at exit and entry ends of adjoining machines.

For flexibility, each unit in the transfer machine can be operated independently by selection of controls. This aids quick checking and tool setting. Individual controls also serve as a safety factor in case of breakdown.

Productivity of transfer lines is maintained at maximum by a bank of parts between each transfer machine. These banks are used to keep machines running while one is stopped for service such as tool change or repair.

Tool changes are further simplified by pre-set tools which are set in quick-change chucks by groups for each machining unit. Tool presetting is done during the machine's operation. The tool setter need only

EVEN THE BEST CAN BE IMPROVED



Gerotor offers its New QDB series of small capacity pumps as proof!

Gerotor has redesigned its series of small capacity pumps to give even more . . .

- **FLEXIBILITY**—the QDB can be operated in either clockwise or counter-clockwise direction by simply changing the position of one internal plug!
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- **DEPENDABLE SERVICE**—the QDB is built to give more dependable service over a longer service span than any comparable pump. Its longer life reduces your maintenance and replacement costs.

If you have need for pumps in the QDB range, call on Gerotor.

Gerotor makes a complete line of hydraulic pumps in ranges from .4 g.p.m. to 40 g.p.m. The Gerotor engineers can help you solve your hydraulic pump problems. Write for *free literature* and full particulars.

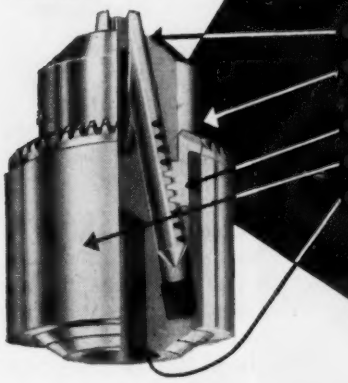
Check this Capacity Table

Type	Delivery g.p.m.—1800 r.p.m. Discharge Pressure p.s.i.				
	0	250	500	750	1000
QDB .4	.42	.40	.38	.35	.31
QDB .75	.84	.80	.78	.73	.66
QDB 1.5	1.67	1.62	1.57	1.50	1.42

GEROTOR MAY CORP. - Box 86 - Baltimore 3, Md.

GEROTOR
HYDRAULIC PUMPS & MOTORS

Here are the points . . .



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Every chuck is individually checked for accuracy . . . you can depend on Supreme Chucks for trouble-free performance and long wear.

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the chuck that lives up to its name . . . SUPREME

stop the machine and replace a given unit's worn tools, without adjustment of machine head stops.

DeSoto's automatic machines do all the heavy work and require very little physical effort on the part of the operator. Automatic inspection has been incorporated for hole depth and location, and for casting shape to protect against tool breakage.

The number of operations, size of work piece, or precision required offer no particular handicap as long as the sequence of operations is practical, and each unit has simplicity and good accessibility.

DeSoto has successfully applied the straight-line transfer method to:

Machining of
- Cylinder Block - - Cast Iron Part
- Cylinder Head - - Cast Iron Part
- Chain Case Cover - Cast Iron Part
- Intake Manifold - Cast Iron Part
- Main Bearing Caps - Cast Iron Part
- Crankshaft Oil Holes (8) - - - Steel Forging
- Torque Convertor Housing - - - Aluminum

Assembling of
- Cylinder Block Welch Plugs (6)
- Cylinder Block Main Bearing Bolts (10)
- Cylinder Head Valves Guides (8) and Exhaust Valve Seats (4)

Balancing of
- Crankshaft
- Complete Engine

DeSoto's most highly integrated automation is the rough machining of cylinder heads used on the Fire Dome V-8 overhead valve engine. This cylinder head is a complex part having many precise holes at odd angles to flat surfaces. It is machined in a series of four transfer machines. The part is conveyed automatically between machines by ex-

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CHENOA, ILLINOIS

tension of the transfer bars of each machine. One operator, by push button, controls the operations of these four machines, which extend 160 ft. in total length, perform 186 operations, and operate at a production rate of 70 parts per hour. These four machines mill, drill, ream and tap. Some of these operations are complex. Milling alone includes a generating mill for the hemispherical combustion chamber held to a tolerance of plus or minus 0.002 inches for depth. There are four of these combustion chambers in each cylinder head.

Another interesting transfer machine at DeSoto finish machines and assembles valve guides and exhaust valve seats in the cylinder head. After valve guide holes are finish-machined to a close tolerance, the exhaust and intake valve guides are pressed into the cylinder head automatically from feed chutes in sets of four. After the head is machined to correct diameter and depth of counterbore, four hardened steel rings, C-65 Rockwell hardness, are automatically fed from supply chutes through a liquid nitrogen freezer (-360 deg. F.) and pressed into cylinder head.

Last stations finish machine exhaust and intake valve seats, and bore and ream valve guides to ensure concentricity to valve seats. This

STURDY

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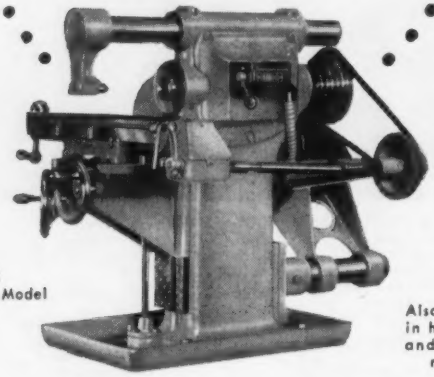
BENCH MILLERS

are so amazingly versatile they can almost reproduce themselves. Thousands in service in tool, school, development, repair and mass production shops.



Burke No. 4 Power Feed Model illustrated.

Also available in hand-feed and universal models.

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THE U. S. BURKE MACHINE TOOL DIV.

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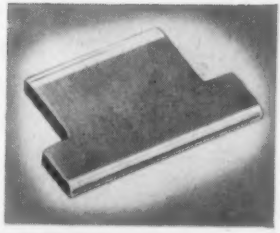
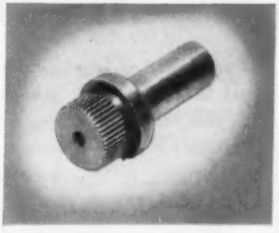
TEN TIMES FASTER than previous methods—broaching top and bottom radii on these automatic transmission reverse band anchors is helping one manufacturer lower the break-even costs. The broached part is not only more accurate, but thousands of the anchors are being machined between broach sharpenings.



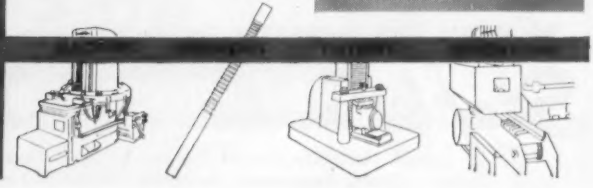
THIRTY TIMES FASTER than milling—broaching the intricate shapes of these copper breaker points has meant lower costs. Seven pieces are broached at a time using only two sets of Colonial broaches. 75,000 breaker points are completed before it is necessary to sharpen the broaches.

TWENTY TIMES FASTER than other methods—serrations on this shaft are cut with a button broach in a single pass. Hundreds of other applications on file at Colonial attest to the tremendous cost-cutting potential of "Unified Broaching." Send us prints of your parts—we'll show you how to cut costs.



Unified Broaching

COLONIAL



machine has 23 stations, and is controlled by one operator, who watches machine functions as indicated on an electrical push button panel. Red and green panel lights inform the operator of the part's progress.

These transfer machines are extensive and complicated combinations of mechanical, hydraulic and electrical equipment. However, by unitizing machine functions, including high pressure hydraulic units, these large machines are far more reliable and easier to service than the rotary index types.

The straight-line transfer has been so satisfactory at DeSoto, we realize the integration of operations by this principle should be carried further. We would even like to see transfers developed for machining pistons and connecting rods.

Our machine lines now for pistons and rods consist of the most modern rotary index and other type multi-station machines. Nevertheless, as contrasted to our transfer machines, these lines are less dependable, require more supervision and maintenance than we believe is necessary if unitized transfer machines were used. Furthermore, our present piston and connecting rod machining lines are more susceptible to manipulation of production rate and

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NEW PORTER-CABLE PORTABLE BAND SAW

CUTS METAL 15 TIMES FASTER

THAN HAND HACK SAW!

High, tight, awkward spots like this are easily accessible to Porta-Band. Cuts operator fatigue, too!

Why carry bar stock or pipe to stationary band saw, interrupt necessary work there, then carry stock back? Use Porta-Band!

On "tailor-made" jobs, general maintenance, or teardowns, Porta-Band does the job in far less time than hand hack saw.

Slices through 1½" cold rolled steel in 41 seconds! That's fifteen times faster than a good man with a hack saw . . . *two-and-a-half times faster* than bulky power hack saws!

You can use this 16-pound work-demon anywhere — on ferrous or non-ferrous metals or "problem" materials. Take it into equipment yards, stock bins . . . tight spots where costly hand sawing is the only other answer. Compact, easy to handle, Porta-Band delivers smooth controlled sawing in any position. Only the cutting part of the blade is exposed. Cutting action pulls blade snugly into cut, holding saw firmly in place.

Powered for heavy duty . . . perfectly balanced . . . Porta-Band handles the toughest assignments. Band speed of 240 feet per minute insures swift, smooth cutting of all materials up to 3¼" diameter round, or 3¼" x 4¼" rectangular. Highest grade precision ball and needle bearings throughout. Aluminum alloy frame for lightness, toughness. Universal 115V AC-DC, 25-60 cycle motor (230V available at extra cost).

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Manufacturers of Speedmatic and Guild electric tools

scrap produced, as compared to parts made on transfer machines.

DeSoto bodies are conveyed through manufacturing on a system of automation called Power and Free Conveyors. By these power and free conveyors, bodies are moved and routed through a system of overhead tracks and switches without manual handling. Bodies are carried on a double line for final body welding, door hanging, paint preparation, and painting, and on a single line for installing wiring, heater, instrument panel, upholstery, hardware and moldings.

This DeSoto Body, Power and Free Conveyor System is supervised from a central control room. Supervisor observes operations from control panel lights, and communicates with stations by telephone. A total of 56 conveyors, extending five miles in length, are started, stopped and synchronized with each other for a required production rate of bodies, from this central control room.

These are a few applications of automation as it is being used to produce DeSotos. With the experience we have had with this new production "magic," we of DeSoto are sure its full potential has yet to be completely realized.

(Editor's Note: The foregoing was presented on the program of the 18th Annual Westinghouse Machine Tool Electrification Forum.)

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These jobs will stand up under severe service—and they're fast . . . . accurate . . . . steady. Modern precision machining (stressing ruggedness and simplicity) has seen to that. But it also accounts for their very low maintenance, surprisingly low cost and broad, all-around versatility. With Rousselle presses you can shear, punch, bend and form metals; cut and punch paper; form and trim fibre and plastics and handle other materials.

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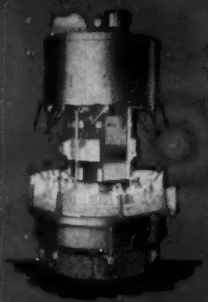

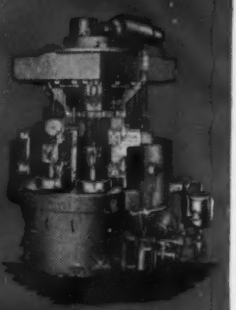

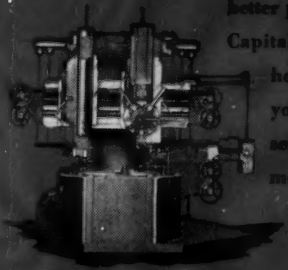

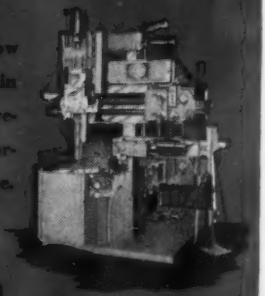

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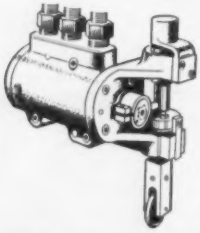
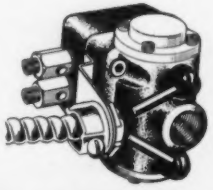


USE UNBRAKO SOCKET CAP SCREWS for compact designs to save space, weight and material in machine tools and equipment.



On textile machines, automotive equipment, electrical and electronic devices, and production machinery.

Do you really need a special UNBRAKO ?

Before you specify a special socket screw, check UNBRAKO Standards. A standard UNBRAKO will do the same job much cheaper in most cases. You'll get better service and faster deliveries, because UNBRAKO socket screw products are stocked by your industrial distributor. Write for UNBRAKO Standards. STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.

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On precision instruments, dies, jigs and fixtures, and many other applications too numerous to mention.

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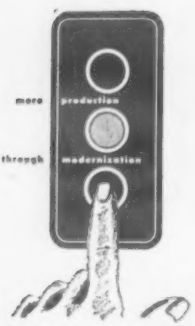
Intensive Apprenticeship Training Assures Skilled Craftsmen

Volkert Metal Stampings, Inc., launches unique apprenticeship program for tool and die makers.



AN intensive apprenticeship training program designed to develop thoroughly skilled craftsmen has been inaugurated by John Volkert Metal Stampings, Inc. So important does this organization consider the factor of training that it has allotted one section of its newly-constructed plant building in Queens Village, N. Y., to the exclusive use of tool and die maker apprentices. The apprentices are provided with their own benches, tools and all the basic toolroom machines.

The Volkert apprenticeship program is described as revolutionary and unique for small industrial enterprises. Working under a veteran tool and die maker employed as a full-time instructor, the apprentices receive constant instruction from him and, in addition, specialized instruction from other Volkert craftsmen.

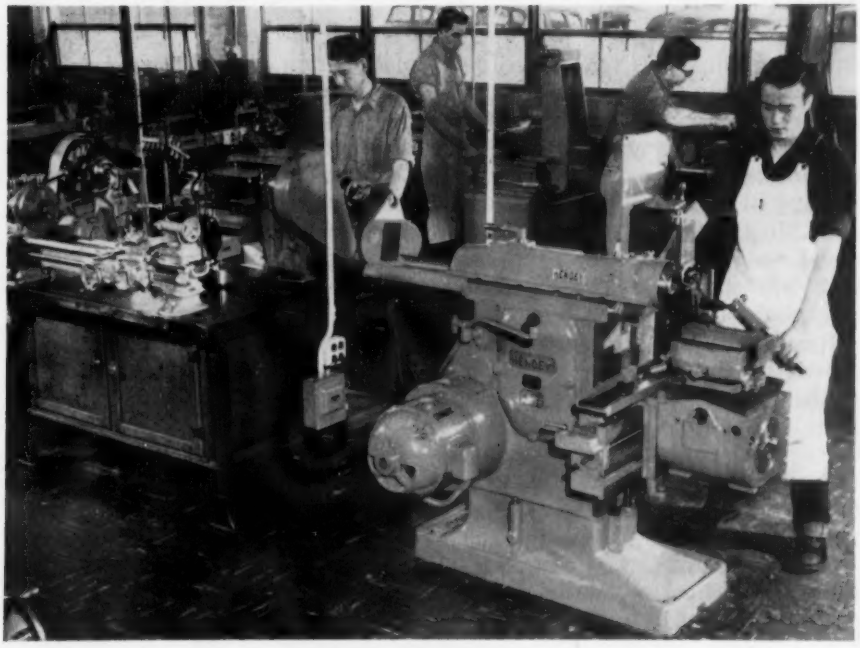
"We recognize that high-precision tooling skills are in great demand in our mass-production economy," Jack Kleinoder, general manager, said, "and we've stepped up our apprenticeship program. We have been training apprentices on a small scale since our company was founded in 1934, but we now hope to have about a dozen or more at all times. Six are already taking the course."

This is believed to be one of the most ambitious apprenticeship programs ever launched by a company of the size of Volkert (140 employees), which is a leading supplier of precision metal stampings for the electronics industry. The program, covering four years for each apprentice, has the approval of both the New York State Apprenticeship Council and of the National Tool and Die Manufacturers Association. Mr. Kleinoder is chairman of the Apprenticeship Committee of the National Tool and Die Manufactur-

Francis Beck brings nearly a half century of tool and die work experience to his job as supervisor of apprentice training at John Volkert Metal Stampings, Inc., Queens Village, N.Y. He is shown instructing an apprentice in surface grinding procedure.

ers Association and is recognized as an authority in apprenticeship training. Francis Beck, a

To develop into highly skilled craftsmen, the Volkert apprentices must muster the basic machines of the toolroom. On the shaper in the foregound, for example, they gain knowledge in proper tool-bit grinding, holding work, surface and angle cutting, squaring, speeds, and feeds, as well as safety.



Bench work comprises almost half of the 8000-hour Volkert apprentice training schedule. Among other things, the apprentices learn hand filing, micrometer reading, use of gages, layout work, assembling and finishing of dies, and die repair work.

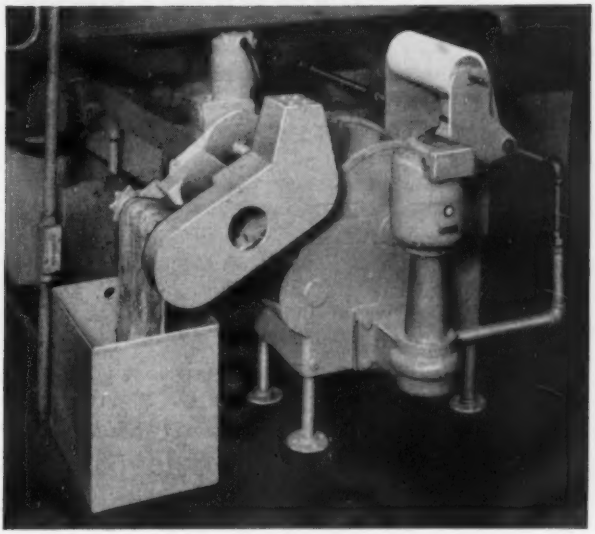
veteran of almost 50 years as a tool and die maker, has been appointed Volkert's supervisor in apprentice training. Working under Mr. Beck, apprentices will receive intensive training in their own shop for three years. In the fourth year, they will spend most of their time in the Volkert toolroom under actual working conditions.

Related classroom instruction, approved by the Board of Education of the City of New York, is being given to the apprentices in the Volkert plant two evenings a week. This instruction exceeds the minimum requirement of 144 hours per year.

All applicants, who must be at least high school or trade school graduates, must pass rigid aptitude, qualification and physical examinations. Apprentices sign an agreement under which they are hired for a 90-day probationary period. The basic work training schedule includes the following machines and processes: tool crib, drill press, shaper, milling machines, lathes, grinders, filing machine, contour cutting, heat treating, bench work and miscellaneous machines.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

CLEANER COOLANTS



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Dual cleaning action of **BARNESDRIL** Kleenall Filters provides low-cost volume cleaning by magnetic separation, and positive precision cleaning by a preselected filtering media of specific porosity, to obtain complete removal of all contaminants both magnetic and non-magnetic.

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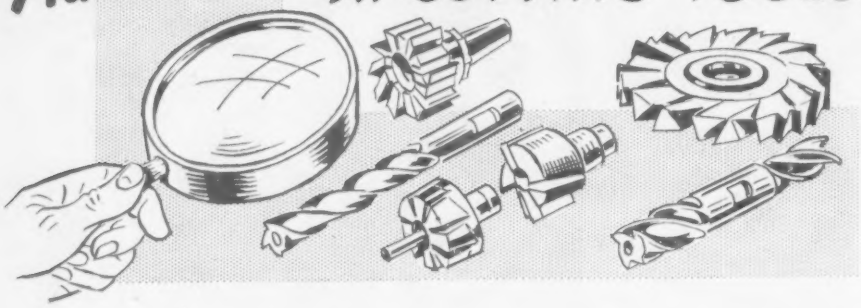
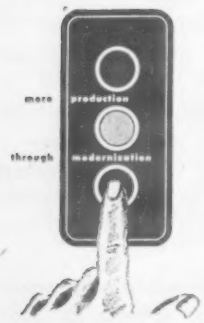
AUTOMATION-DEMANDS A LOOK AT CUTTING TOOLS



In which the author stresses the importance of special tool engineering to keep tools working continuously and thereby make automation really economical.

By A. O. SCHMIDT
Research Engineer, Kearney & Trecker Corporation



THE most impressive array of machine tools, supplementary handling equipment, and control instruments for automation will always depend mainly upon the proper cutting action of the tool to deliver the expected performance. The results of published metal cutting research often permit us today to select the type of tool material most suitable for the job as well as to maintain the desired metallurgical properties for machining in the workpiece material, and to select proper feeds and speeds. Newly developed HSS types, cast materials, and carbides give a wide choice in tool materials.

The phenomenal cutting speeds often reported for a single test, and usually for comparatively light cuts of short duration, have limited use in automated machinery. It is much more important to keep the tool running as long as possible to eliminate time losses due to cutter changes. With this in mind, the range of cutting speeds for milling various materials with carbide cutters is between 250 and 350 fpm for cast iron and between 400 and 700 fpm for mild steel, but for aluminum and

magnesium alloys speeds may go up to 10,000 fpm. These figures will be modified towards the lower limit when the material is scaley or hard, and extended upward when the cut is light and the workpiece of a uniform and suitable microstructure. Likewise, for roughing operations the cutting speed will approach the low limit and the feed per tooth the high limit, while for finishing operations the speed will approach the high limit and the feed the low limit. It should be remembered that the tool tip temperatures will increase with the cutting speed and the higher these temperatures, the faster the tool will wear. *To keep equal time intervals between cutter changes of roughing and finishing spindles, the roughing cutters would have fewer but stronger teeth for heavier feeds,* while the number of teeth in a finishing cutter would be higher and the tool material itself more wear resistant.

It is a fact that the number of workpieces made per tool grind may vary by as much as 100 per cent from one lot to the next even with metallurgical control of microstructure, hardness, and other factors. In castings, it frequently happens that the dimensions are much larger than the specifications call for and such excessive stock often will cause cutter breakage. The tool engineer often can eliminate such cutter breakage by designing stronger tools. However, if these difficulties are anticipated they should be given consideration while the tools are being designed the first time; otherwise it may be impossible to redesign the tools for optimum performance under the conditions of automated production.

Dimensional variations in the workpiece will affect the power requirements, and greater depth of cut or higher feed rates will increase the power demand proportionately. Tool wear usually will increase the power requirement often by as much as 100 per cent, and sometimes even more. Very definitely some indication should be utilized to recognize permissible limits of tool wear in relation to workpiece accuracy obtained, to the wear on the tool itself or to changes in power demand. Chip interference in the tool itself or weld-

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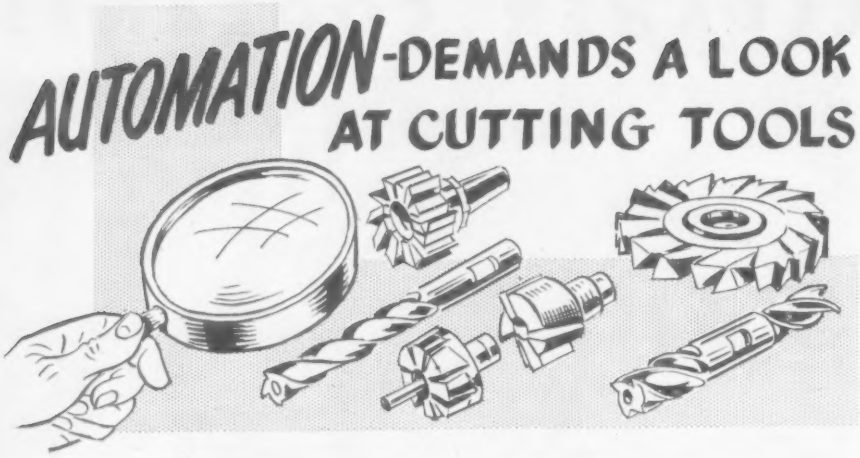
AUTOMATION-DEMANDS A LOOK AT CUTTING TOOLS



In which the author stresses the importance of special tool engineering to keep tools working continuously and thereby make automation really economical.

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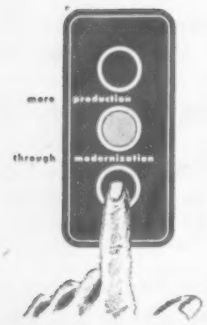

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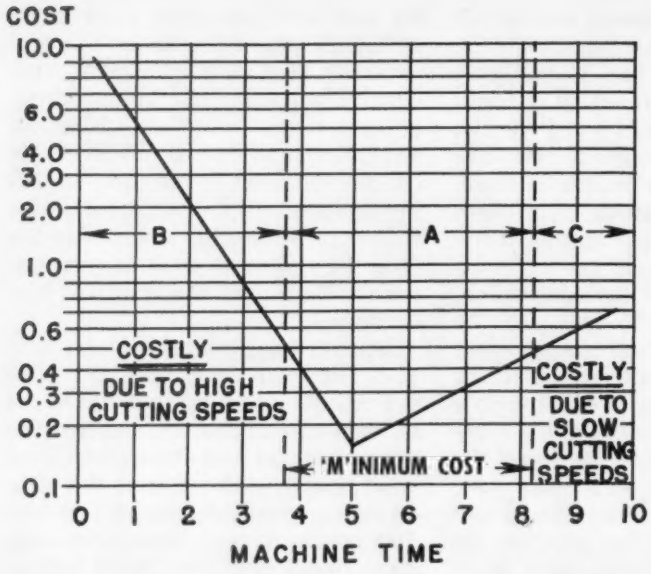
Dimensional variations in the workpiece will affect the power requirements, and greater depth of cut or higher feed rates will increase the power demand proportionately. Tool wear usually will increase the power requirement often by as much as 100 per cent, and sometimes even more. Very definitely some indication should be utilized to recognize permissible limits of tool wear in relation to workpiece accuracy obtained, to the wear on the tool itself or to changes in power demand. Chip interference in the tool itself or weld-

▲

". . . the roughing cutters would have fewer but stronger teeth for heavier feeds . . ."



Curve showing the relationship between machining time and cost in a transfer type machine tool. "A" is the economical range with "M" as minimum cost. "B" is the region of increased cost due to cutting speeds which are too high causing frequent cutter breakdown and changes. "C" at the right is an uneconomical region of slow cutting speeds.

ing of the chips to the cutting edge frequently cause tool breakage and often can be eliminated by proper tool design, tool materials, or application of a cutting fluid. Because of chip interference the majority of machining operations with automation are limited to cast iron. However, it is possible to design the tool in a way such that it will produce short chips even when machining steel and other ductile materials. The successful solution of this problem either through metallurgy or tool design will open up an entire, new field for the application of automation.

Whatever the case may be, no machine tool should be started initially with an overload; there should always be a horsepower reserve to take care of any increase in power demand, whether due to differences in workpiece dimensions or material, dulling of cutters, or even momentary overload caused by "hard spots." Even if the cutters should not break, shortened tool life is often associated with continuous overload in the machine.

Scale or sand inclusions create a problem in each individual workpiece. The optimum cutting speed and feed and the most suitable tool material, tool angles, and sequence of operations often can be determined only by tests with the actual workpiece. Generally, it can be stated that the machining of hard workpieces requires milling cutters which have a rigid body with movable blades positioned in a manner such that the major wear areas can be efficiently reground. This will also eliminate weakening of the cutter body when regrinding the teeth repeatedly, since the grinding wheel need touch the teeth only. Gaging, checking, and changes of tools should be provided for in a way not requiring long shut-downs of a line of machinery.

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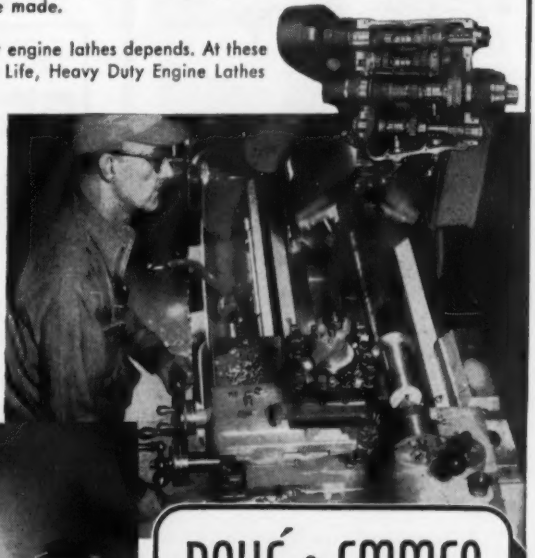
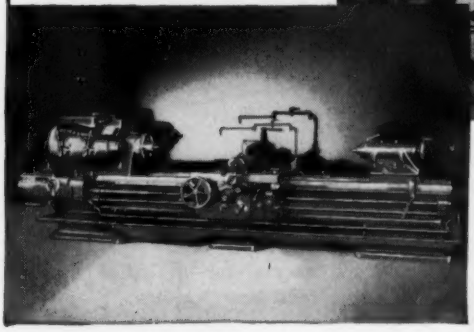


"Back-gear-in-front" guards spindle bearings during heavy cuts.



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be adapted to automation of the machining process, so too must tool design, and along with it, tool wear, tool changing, and regrinding be given primary consideration rather than be treated as an afterthought.

Automation with the use of machine tools includes not only efficient materials handling, and short cutting times but also special tool engineering to keep the tools working continuously and thereby make this type of operation really economical.

(Editor's Note: The foregoing was presented as part of a panel on automation at the 18th Annual Westinghouse Machine Tool Electrification Forum.)

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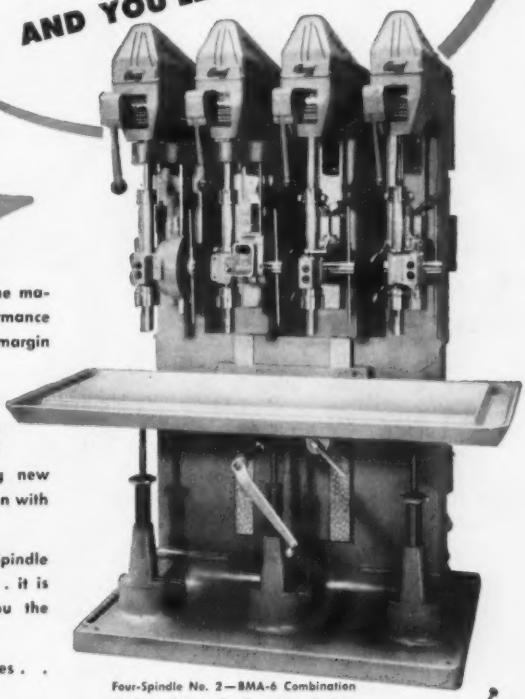

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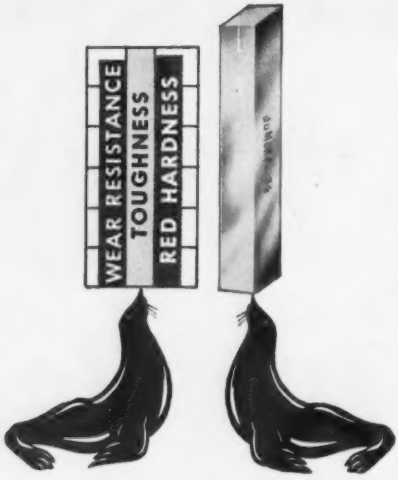

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July 13-15

Western Plant Maintenance Show and Conference, Pan Pacific Auditorium, Los Angeles, California.

August 2-4

National Tool and Die Manufacturers Association, Board of Trustees and Committee Meeting, Grand Hotel, Mackinac Island, Michigan. Association headquarters: 907 Public Square Bldg., Cleveland 13, Ohio.

August 9-10

American Society for Quality Control, First Annual Western Regional Conference, U. S. Grant Hotel, San Diego, California. Society headquarters: Room 5036, 70 E. 45th St., New York 17, New York.

September 5-8

Pressed Metal Institute, Annual Fall Meeting, Manoir Richelieu Hotel, Murray Bay, Quebec. Institute headquarters: 2860 E. 130th St., Cleveland, Ohio.

September 8-10

American Society of Mechanical Engineers, Fall Meeting, Schroeder Hotel, Milwaukee, Wisconsin. Society headquarters: 29 W. 39th St., New York City, New York.

September 10-12

Metal Powder Association, Fall Meeting, The Homestead, Hot Springs, Virginia. Association headquarters: 420 Lexington Ave., New York City, New York.

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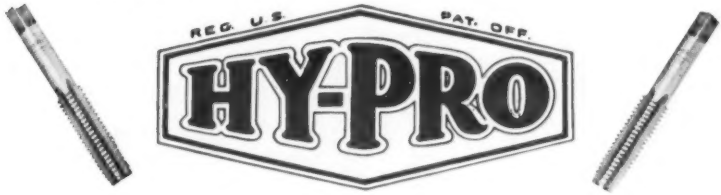

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The R50

143 more cuts

California mine bit manufacturer rates R50 rubber cut-off wheel best ever used. Gave 735 cuts to competitive wheel's 592, for 24% more wheel life.

Better performance

Connecticut machine tool manufacturer says R50 wheel outperformed competitive wheel, cutting freer on wet cutting of high carbon tool steel. (see photo).

120% longer life

Indiana construction equipment manufacturer reports R50 wheel produced 216 cuts, 120% more than competitive wheel's 98 cuts.

No burn or breakage

Kentucky manufacturer of garbage disposal units found R50 wheels eliminated the breakage problem and produced a cut free of burr and burn.

450 more cuts

Missouri manufacturer of coal mining equipment used an R50 wheel to cut 12 bars at 90 cuts per bar, totalling 1080 cuts. Beat best previous wheel's record of 7 bars, 630 cuts, by 70%.

Freer cutting, longer lasting

Massachusetts manufacturer of pneumatic tools reports R50 wheel 25% more durable while producing an equal quality of cut. Freer cutting, with less of usual rubber wheel odor.

25% more cuts

Connecticut machine manufacturer reports R50 wheel produced 25% more cuts than competitive wheels, with equal freeness and cleanness of cut.

The B9

72% more durable

Michigan engine manufacturer says B9 wheel produced 250 cuts over competition's 145, lasting 72% longer.

Lasted three times longer

Ohio metal working company reports B9 gave three times the service life of competitive wheel, with excellent cutting performance.

40% more cuts

Pennsylvania die manufacturer found B9 wheel out-produced competitive wheel by 40% giving 252 cuts as against 180.

36% production increase

Missouri metal company tells how B9 gave 75 cuts to competition's 50-55, proving 36% longer lasting.

Best wheel ever used

Michigan tool manufacturer, using B9, gets twice the number of pieces previously cut. B9 rates best wheel ever used on this job.

150% over competition

Maryland metal working company says B9 wheel gave 125 cuts, topping competitive wheel's 50 cuts by 150%.

42% more cuts

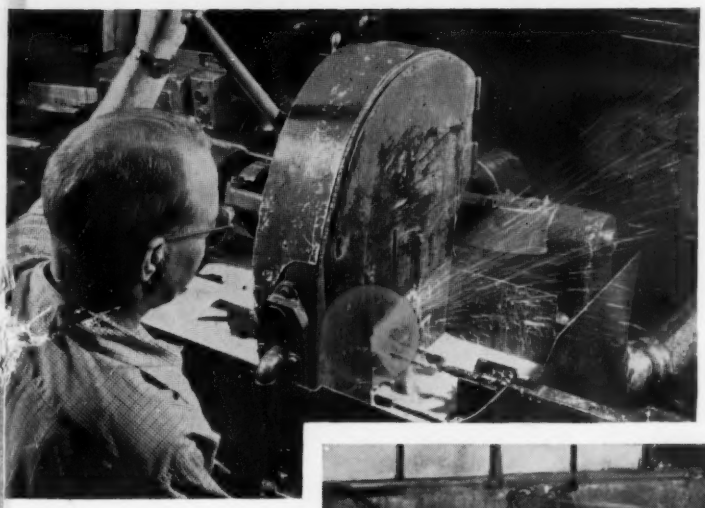
Pennsylvania construction equipment manufacturer averaged 125 cuts with B9 wheel, 42% over competitive wheel's average of 88 cuts.

85% longer life

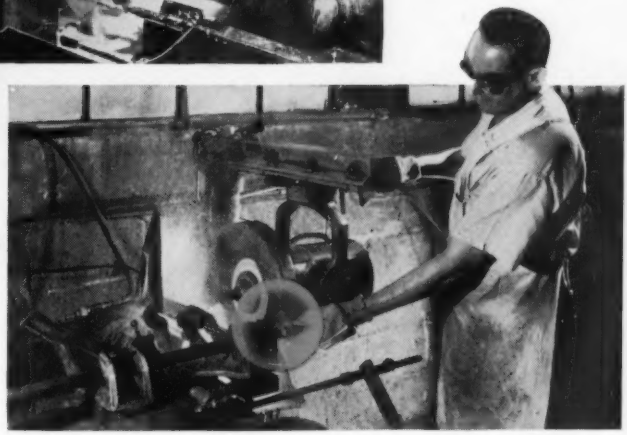
California forge and pipe foundry reports B9 lasted 85% longer than any other wheel.

27% more durable

Ohio aircraft manufacturer, cutting a wide variety of bar stock, says B9 wheel delivered 27% longer life than competitive wheels. (see photo).



The New Norton R50 rubber bonded cut-off wheel is designed especially for wet-cutting of ferrous or non-ferrous bar stock up to 6" diameter. Built-in chip clearance — a great advancement in this type of wheel — is one of its special "Touch of Gold" advantages that assure freer, faster cutting with maximum strength and service life.



The New Norton B9 resinoid bonded cut-off wheel is made with either smooth sides or with the rough "F" sides for more clearance in the cut. It is a high production wheel, cutting free and cool with minimum burning. It will give you long, economical "Touch of Gold" performance in the widest range of ferrous and non-ferrous applications.

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1	.17	.40	.25	3.20	1.15	.15			
2	.35	.30			5.00	1.15	1.10		
3	1.01	.27	.23						
4	.90	1.25	.30		.50		.50		
5	1.05	.65	.30		5.25	1.10		.25	
6	1.50	.32	.30		11.80	.80		1.00	
7	.25	.29	.26		4.03		15.10	.52	
8	.85	.25	.30		4.15	5.10	6.30	2.05	
9	.87	.26	.25		4.00	4.60	5.60	1.80	9.00

The complexity of tool steel classifications can be simplified to some extent by dividing them into groups. This table shows one method which divides them into nine groups. Most tooling applications can be covered by compositions similar to those shown.

Selection and Heat Treatment of Tool and Die Steels, Part III

The author concludes his discussion by individually treating the application of the nine different classes of steel shown in Table I.

By Howard E. Boyer

IF the tool engineer has a fair understanding of the simple but basic fundamentals discussed in the foregoing parts of this article, he should be much better equipped to make proper selections of tool or die steels for given applications. The nine different families or classes of steel shown in Table I will now be discussed individually relative to how they compare fundamentally along with the general types of tool or die applications which they will probably serve best.

The steel shown in Class 1 may not rightfully be considered strictly as tool steel, for this same composition (AISI-9317) is made and marketed as an engineering steel. It is also made by tool steel mills for certain die applications and is considered an important contributor to the family of tool and die steels. From the low carbon content it is obviously a carburizing steel. In spite of the fact that the carbon is low, the alloy content is quite high so that it is termed as a high hardenability steel, even though the maximum obtainable hardness is only about

Rockwell "C" 40, except when it is carburized. One of the applications to which this type of steel is particularly well suited is as a material for making plastic molding dies. This steel can be carburized so that a case depth up to 0.100 inch can be readily obtained and subsequently hardened so that the case structure is completely martensitic, appearing very similar to the photomicrograph in Figure 1. The maximum obtainable hardness on the case portion of this steel after carburizing is about Rockwell "C" 63. Since the carburized case does not usually contain any appreciable amount of free carbide, the Vickers hardness value and Rockwell "C" value will correlate quite closely on this type of structure. Thus, this steel when properly heat treated possesses a case which will compare favorably in hardness value and abrasion resistance to the surface of a 1 per cent carbon low alloy tool steel, but at the same time the core is somewhat softer so that it is extremely tough and resistant to impact. Therefore, it does serve many tool and die applications where such properties are demanded.

It must be remembered in the instance of this particular steel, as well as any other tool steels which are carburized, that never more than 20 per cent of the total case should be removed in finishing operations after heat treating. This is an error which occurs every day in many machine shops. That is, those who are unfamiliar with metallurgical properties tend to believe, for example, that if one desires a case depth of 0.050 inch on the finished tool he may obtain a finishing stock of 0.030 inch by simply carburizing the work to a depth of the total which is 0.080 inch. This is definitely a misinterpretation, because the carbon concentration and consequently the abrasion resistance and hardness of the case decreases gradually, so under the conditions just mentioned the better portion of the case would be removed. Case depth allowance for finishing operations must never be more than 20 per cent of the total case; otherwise important metallurgical properties will be completely lost. While carburizing

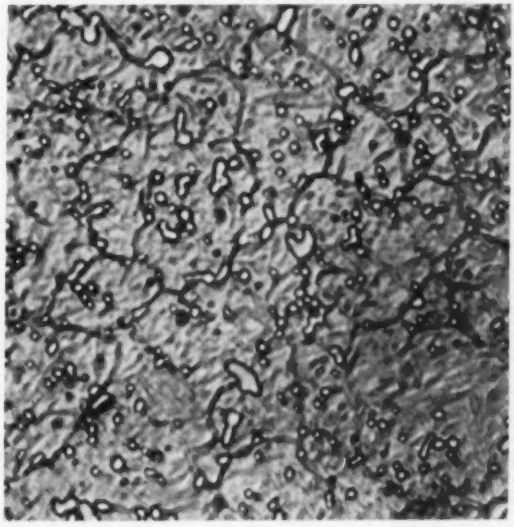

Fig. 9—Microstructure of hardened high speed steel — Class 8. This steel would be considered slightly underheated. The structure is not quite fully hard by the usual methods of measuring hardness, but is tough and abrasion resistant. Magnification, 1000X.

steels do serve a number of tool and die applications, they are not usually practical for any sort of dies which must be periodically ground because the case is removed and it is impractical for the most part to continually recarburize the dies.

One of the best known uses for the steel shown in Table I as Class 2 is that of making die-casting dies. Suitable steels for this application have been most difficult to develop due to the heat which they must withstand during operation, as well as the fact that they are subjected to erosion from the hot metal entering the dies under extremely high pressures. Since this steel is a low carbon composition, the maximum obtainable hardness, even though the alloy content is relatively high, is about Rockwell "C" 55. For die-casting applications this hardness is usually reduced purposely by tempering down to about Rockwell "C" 45. There are many steels which belong to this class, usually varying in carbon content from about .35 per cent as shown, up to about .55 per cent. The most common term for the entire family is the "hot work" class, although they are also frequently termed as the "shock resisting" family. Properly heat treated steels belonging to this group are extremely tough and resistant to impact and heat, although they are not usually suitable where abrasion is encountered, because of the fact that the highest possible hardness by straight heat treating is relatively low, due to the lower carbon content. Practically all of the steels belonging to this family lend themselves very well to case hardening by nitriding. In other words, for

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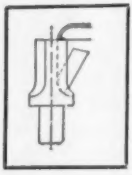

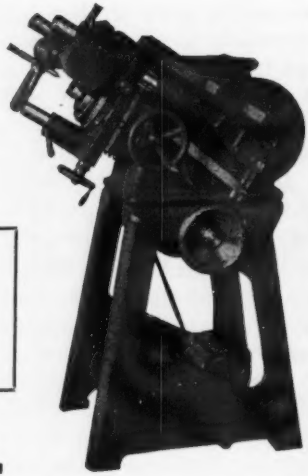

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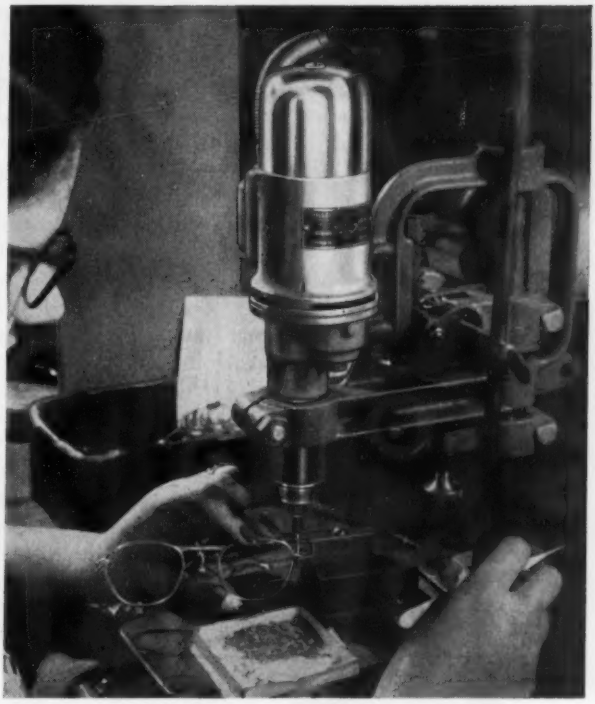

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applications where consecutive grinding operations are not performed and where the tough and shock resisting core properties are demanded, a hard and abrasion resisting exterior can still be applied by the regular ammonia gas nitriding method. A wide variety of dies is now made from steels of this type and case hardened by nitriding.

The composition shown in Class 3 is a simple water-hardening tool steel, one of the oldest compositions known to the tool industry. It is still a most popular steel to employ for applications such as cold heading and various types of punches which are relatively heavy in section. This steel is a shallow hardening steel so that when it is heated and water quenched the result is an extremely hard exterior which rapidly tapers off to a more ductile core, a most desirable condition for many applications such as those just mentioned and many others. The disadvantage to the use of this type of steel is mainly from the fact that it is strictly a water-hardening steel so that dies or tools which are relatively intricate in design and where sections varying widely in thickness must be used there is no question of the fact that designers should refrain from the use of this steel because the water quench will tend to cause excessive warpage and frequent cracking due to the wide difference in cooling rate throughout the sections. The microstructure obtained from water quenching this steel is usually fully martensitic at the surface. In other words, there is usually very little free carbide so that the structure is one of the homogeneous type with a maximum hardness of about Rock-

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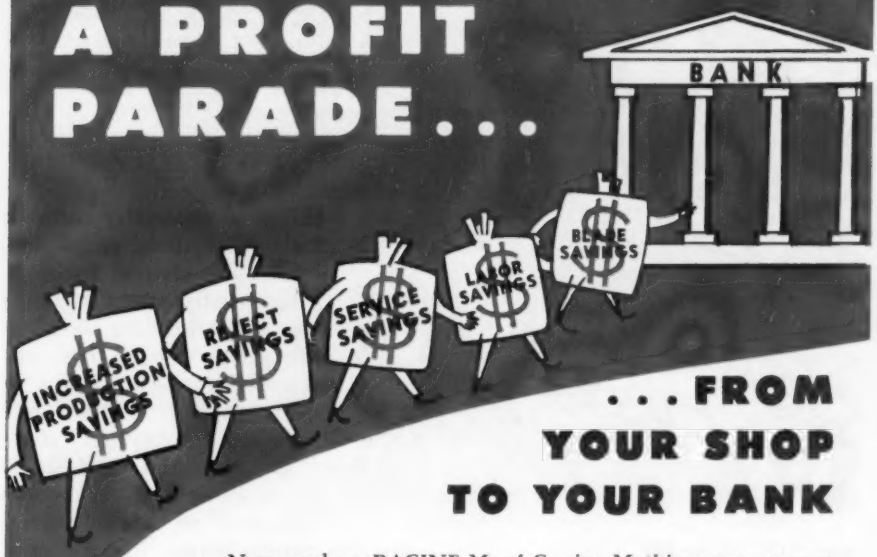

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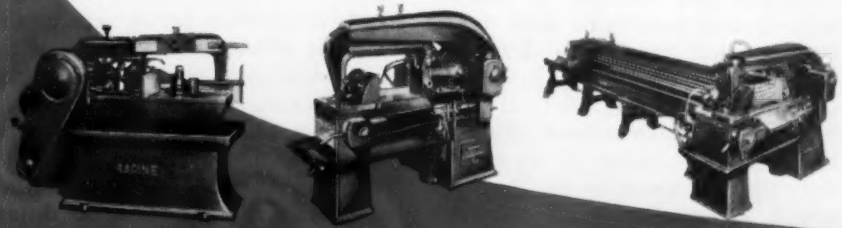

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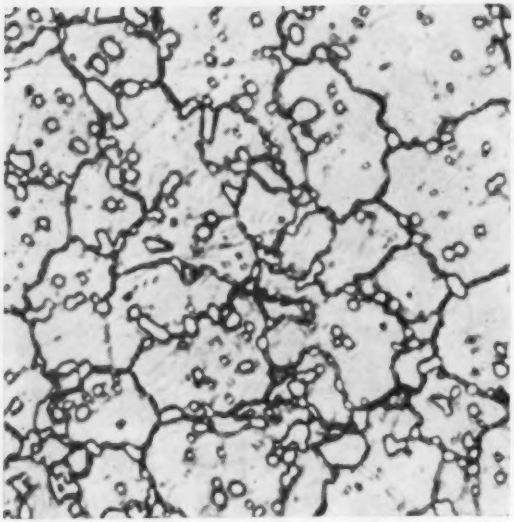

Fig. 10—Same steel shown in Fig. 9 except the heat-treating temperature was increased about 50 deg. F. The grain is now a great deal coarser and consequently more brittle compared to the structure shown in Fig. 9. Magnification, 1000X.

well "C" 64 or 65.

Tools or dies made from this water hardening type of steel should never be used where temperatures exceed about 250 deg. F. or the mechanical properties will be altered to at least some degree.

Tool steels comparable to the composition shown in Class 4 are well known and respected by tool designers and toolmakers. This relatively deep hardening steel can be heat treated to a high degree of hardness by quenching in oil, although the resulting microstructure is essential martensite so that the true hardness value is no greater than that registered by the Rockwell which is usually about Rockwell "C" 62-64. The relatively high manganese content augmented by small percentages of chromium and tungsten provide the non-deforming properties which are well-known characteristics of steels belonging to this Class. These properties make this steel especially suitable for master tools, gages and intricately shaped tools. It is frequently used for blanking and trimming dies, although its use for these applications should always be questioned sharply because a carefuly study may show that the same dies made from steels belonging to Class 5 or Class 6 will provide much longer life for only a little greater investment. In spite of some alloy content, this steel is in no way resistant to elevated temperatures, so that it should not be employed for applications where temperatures exceed 250 deg. F.

Class 5 steel has enjoyed a reputation for a number of years as a leader in the field of low-cost wear-resistant die steels. Its higher alloy content provides for a considerable amount of free hard carbide in the microstructure so that the resistance to abrasion and wear is far superior in most instances to steels belonging to Class 4. In other words, this steel possesses, in the heat treated condition, a somewhat duplex structure which provides for the increase in wear resistance. It is likewise more resistant to elevated temperatures; thus, the tempering temperature employed after air cooling is usually higher so that the steel can be operated, for some applica-

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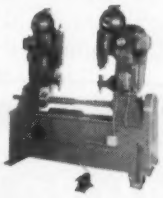

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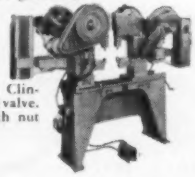

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tions, up to 900 deg. F. without permanent loss of properties. It can be air hardened from about 1750 deg. F. which aids considerably in heat treating intricate dies and tools with a decreased danger of cracking and deformation. This steel serves a host of applications, including bending dies, blanking dies, broaches, cold trimming dies, stamping dies, shear blades, and so on.

The steel shown as Class 6 represents a typical high carbon-high chromium type of air-hardening die steel. The duplex structure obtained in this steel renders the Rockwell almost worthless as a means of evaluating its true properties. This steel is more expensive than other die steels and more difficult to machine, but when its long life between grinds, edge-holding properties and resistance to the effect of elevated temperatures are considered, it is very often the cheapest material in the long run. One of the applications where this particular type of steel is most useful and where most other die steels fail is that of punching the high silicon materials for motor laminations. Due to the high chromium content it is also quite resistant to corrosion, which is a desirable feature for some applications. It should be mentioned, however, that any steels which possess a duplex structure such as Classes 5 and 6 are generally unsuitable for applications where severe erosion is involved, such as that encountered in die-casting dies. The free carbides tend to wash out under such conditions. This steel can be heat treated to a Rockwell "C" value up to about 63 although it must be remembered that this is not an accurate means

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of evaluation, and for most applications hardness as measured by the Rockwell scale is not critical. In fact, for the most part, this hardness value can safely drop as low as "C" 55 without seemingly imparting any marked difference in performance. The reason is fairly obvious. By virtue of the free carbide, which is actually doing most of the work anyway, it is only necessary to provide a matrix which is suitably stiff and hard to lend support and backing to these carbide particles.

The steel shown in Class 7 is also a hot-work steel although it is intended primarily for hot heading dies, extrusion dies and various other types of hot forging dies. For this reason it is assigned a special classification. Due to a low carbon content, the maximum hardness obtainable is not great, although it renders a microstructure which is homogeneous and extremely tough and likewise resistant to high temperatures, which is essential for hot forging. This is another steel which can be satisfactorily nitrided after it has been heat treated and refinished. It can be hardened in either oil or air.

Classes 8 and 9 can be discussed together since they are both high speed steels, although they must be classified separately, for most cases, due to the fact that Class 9 contains an appreciable percentage of cobalt. The addition of this element places Class 9 in a separate classification which we frequently term as the "super high speed steels." Class 8 shows the composition for a typical general purpose high speed steel which is employed for a host of purposes but serves primarily for drills,

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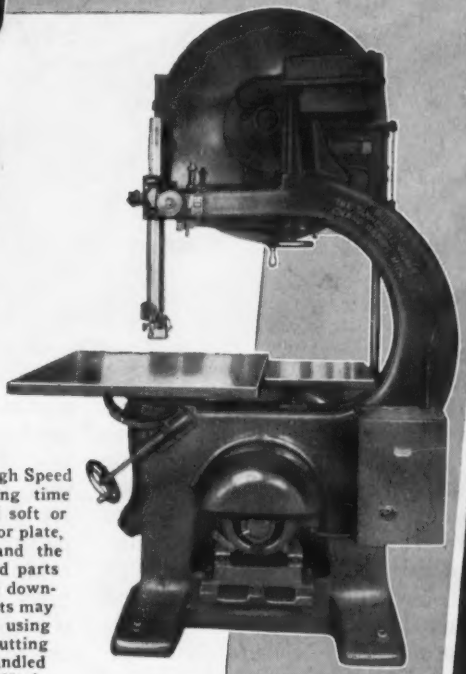

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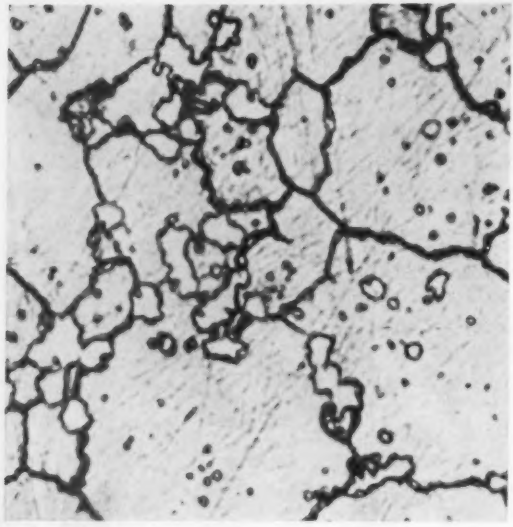

Fig. 11 — Structure of high speed steel (same as shown in Figs. 9 and 10) overheated to the extent that it is now worthless for most applications due to its brittleness. Hardness is Rockwell C-66. Magnification, 1000X.

reamers, gear cutters and hundreds of other cutting tool applications. It is often used for blanking dies and allied purposes, although for the most part die applications can be better served by those which are regarded as typical die steels discussed previously. The "super high speed steels" deserve the name from the fact that they are able by virtue of the cobalt to resist higher temperatures with decreased loss of hardness at operating temperature. In other words, we say that the cobalt bearing high speed steels possess a higher degree of "red hardness." Thus, it is generally more economical to use a steel belonging to Class 9 for heavy duty cutting applications, such as for tools on automatic machines.

So much has been published on high speed steels in general that it hardly seems necessary to go into further discussion on their applications.

The most important consideration in the use of high speed steels is their heat treatment. Careful heat treatment is most important for best results in any tool steels, but the high speed steels, due to the fact that they are heat treated at such extremely high temperatures, are far more critical than most of the others. Tons of high speed tools, well designed and made from the proper steel, are virtually ruined in the heat treating furnace through the lack of knowledge and control. At these extremely elevated temperatures grain growth takes place rapidly so that a relatively few degrees provide for a marked difference in the microstructure, which is the main contributing factor to the performance of the tool in its operating life. An example of what can and does happen is shown in the three photomicrographs in Figs. 9, 10 and 11. These photomicrographs were taken of the same steel and one simulating the composition of Class 8, after air cooling from 2200 deg. F., 2250 deg. F. and 2325 deg. F., respectively. Only a glance is necessary to observe the wide variation in grain size and amount of free carbide left in the microstructure. The microstructure shown after a high heat of 2200 degrees, even

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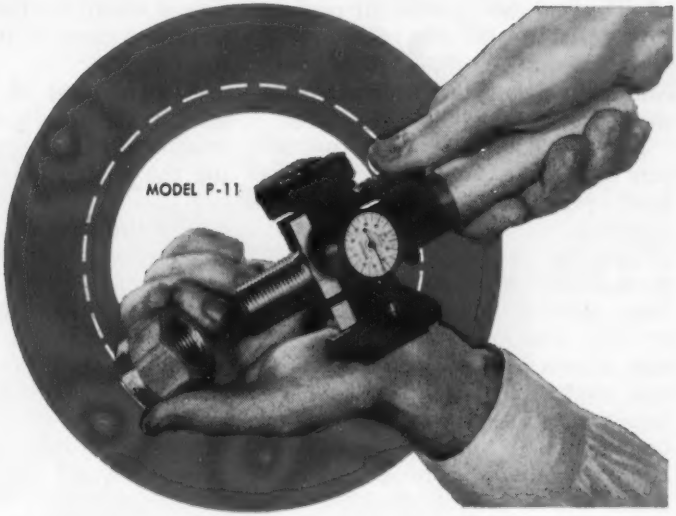

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though it shows a hardness value of Rockwell "C" 62, would generally be considered as slightly underheated. The one shown after air cooling from 2250 deg. F. is regarded as about normal for this type of steel, considering both the grain size and the amount of undissolved carbide.

Figure 11 shows the microstructure of the same steel which has been overheated to the extent that the grain size has become extremely large and the free carbide has almost entirely disappeared for it has been dissolved in the very coarse crystals. The hardness of the specimen shown in Fig. 11 is quite high and might be readily regarded by many as most suitable, but it must be remembered that the free carbide is also a valuable contributing constituent. The reduction of free carbide content together with the fact that such a coarse grain is extremely brittle results in a questionable structure. This is another illustration of where the Rockwell value interpreted literally may be misleading.

A great deal of work has been done in the development of the heat treatment of high speed steels during the past few years and certain new concepts have been introduced. At one time it was the practice that, if a steel came from the quench as "too hard," it was simply tempered at a higher temperature than normal in an attempt to reduce this hardness, which could be done, although in most instances absolutely nothing was gained and some properties were lost, because it has been proved beyond any doubt by many investigators that the basic properties of high speed steel are estab-

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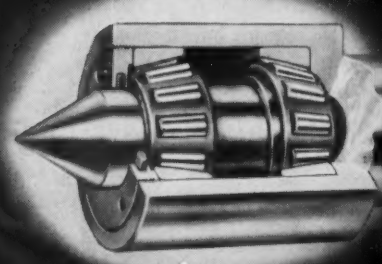

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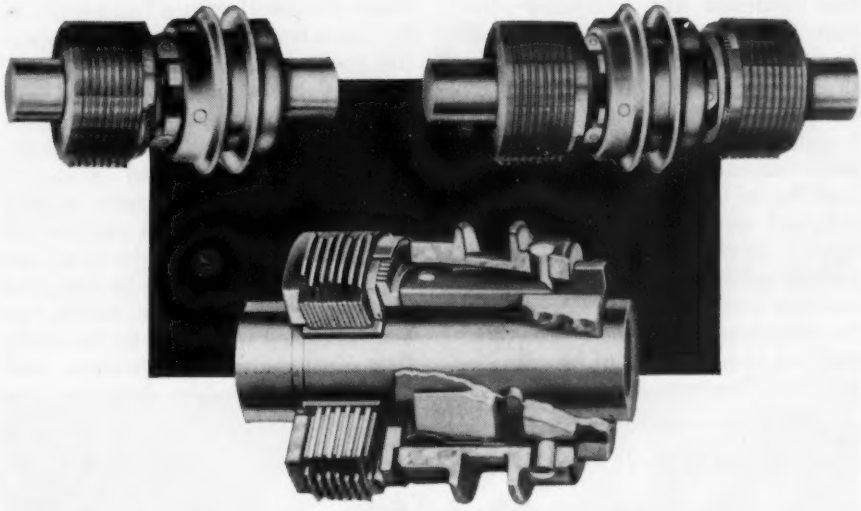

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lished at the high temperature. In other words, a high speed steel with a high degree of hardness and still with an increased toughness value can be most easily obtained by actually underheating it. If the grain size is kept fine, the toughness in the hardened and tempered structure will increase markedly. We have also learned to depend a great deal more on the properties of free carbide and pay less attention to the hardness of the matrix. Super hardness values can be obtained only by sacrifice of the free carbide, so it becomes a question where it is most useful. It would be foolish for the author to make definite recommendations that high speed steels should be underheated, for there are thousands of applications to be considered. It is, however, being offered for its worth and as a suggestion which should be considered in setting up heat treatments for high speed tools. A new concept in high speed steel treating is the tendency to employ lower high heat temperatures, consequently resulting in somewhat lower Rockwell values but which, at the same time, in some other properties are markedly preferable.

The value of extremely thin case liquid nitriding as a post treatment for high speed steel tools, particularly taps, reamers and drills, is gradually becoming more widely recognized. The nitride surface not only increases the hardness at the points where the cutting is done, but also provides a surface which has less tendency to adhere to the work, thus decreasing the pressures and prolonging tool life. No one can

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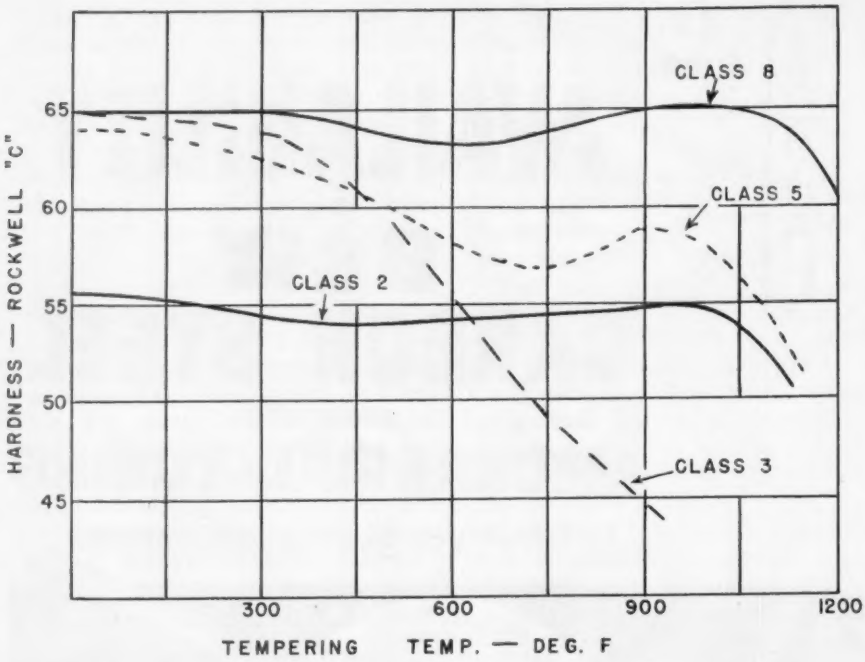

Fig. 12—Chart showing how several different tool steels behave during tempering.

safely state that nitriding will always increase tool life, but usually it does and should always be considered. Various modifications of chromium plating also tend to provide the same benefits when the plating is properly done. The disadvantages of these post treatments is the fact that tools must be retreated after every grind. In spite of this, the practice usually registers an appreciable cost saving.

This treatise would not be complete without some brief discussion of the tempering operation following the high heat and quench or air cool as the case may be. Figure 12 shows the tempering curves for four different steels from Table I. It must be established that all tool steels, irrespective of their class, must be tempered at some temperature after quenching and prior to putting into service if best properties are to be obtained. Apparently most tool engineers realize this although there are still occasions where tools are treated merely by heating in any available furnace, quenching and placing immediately into service; such practice should never be carried on. All tools and dies should be tempered at some temperature between 250 deg. F. and about 1150 deg. F. inclusive, depending upon the composition. Simple carbon or low alloy steels such as those shown in Class 3 and Class 4 may be suitably treated by tempering just once at 250 to 350 deg. F. due to the fact

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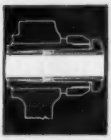

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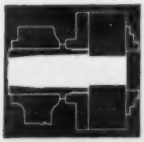

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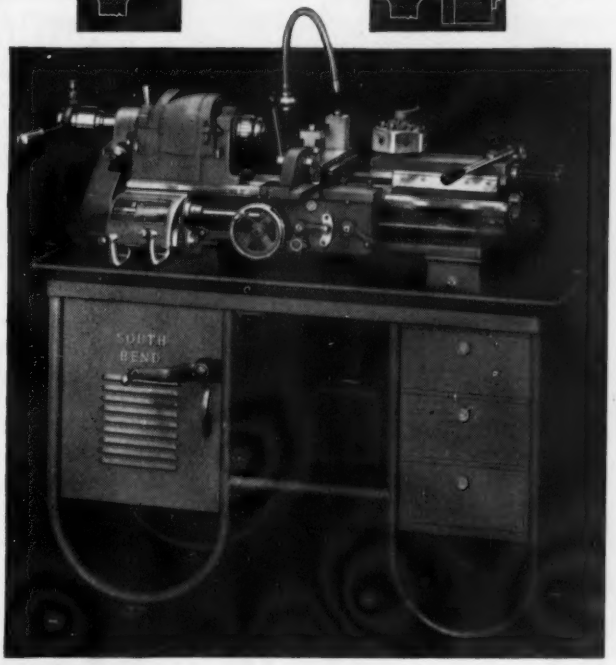

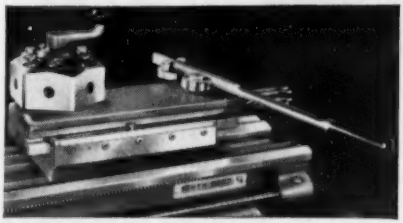

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that the higher the tempering temperature the lower the hardness in the form of a curve as shown as Class 3 in Fig. 12. As the alloy content increases, a markedly different pattern in the tempering curves is obtained. The intermediate alloy steels, Class 5, show that the temperature increase causes a decrease in hardness value up to about 750 deg. F., after which it again increases considerably, reaching another peak at about 900 deg. F. and then dropping off sharply. Steels which exhibit this characteristic are known as secondary hardening steels. The low carbon hot-work steels belonging to Class 2 also exhibit some of this characteristic although the maximum hardness value is much lower. The tempering curve for steels belonging to Class 8 is markedly secondary, hardening to the extent that the hardness value obtained after tempering at 1050 deg. F. is essentially the same as the hardness after cooling from the austenitizing temperature.

It should be emphasized strongly in all machine shops and tool shops that tools or dies made from any of these steels which exhibit this tendency to secondary hardness must be tempered twice for best results. That is, they must be tempered at the temperature which is selected (for example, 1050 deg. F. for Class 8) after which the tools should be cooled completely to room temperature and then tempered again at about the same temperature. Very often due to the time element and the demand for tools, it is well known that this second operation is omitted, which seems almost criminal if one understands the basic

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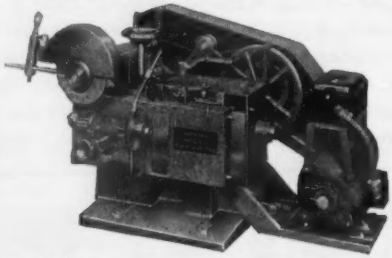
Automatic Metal Saw Grinder

Wardwell's "35 T" will sharpen up to 115 saws .015 thick at one time . . .



This includes slitting and screw slotting saws and milling cutters. Takes saws from 2" to 5½" diameter. Completely automatic. No attention is required after machine is started. These ingenious, compact and sturdy grinders are saving and making money for their owners all over the world.

You owe it to yourself to write for Bulletin 35 T containing full information.

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fundamentals behind double tempering. It is true that further tempering operations are never harmful and may be helpful, although for most practical purposes two complete tempering operations properly performed are probably satisfactory. A complete discussion of why this is necessary will not be attempted here. It can be simply stated that the reason for this secondary hardness stems from the fact that not nearly all of the structure is transformed to martensite initially so that a portion is transformed during tempering. Therefore, if only one tempering operation is employed, the martensite which formed during tempering is left in the untempered condition, which is extremely undesirable. It just doesn't add up economically to make expensive tools and dies and then employ detrimental short-cuts in the performance of final operations.

A great deal of useful working information can be obtained from the tool steel makers, who are generally well staffed with metallurgical engineers, although it seems that since tool engineering has now become a recognized separate profession, it behooves those belonging to this profession to become better informed on the metallurgical fundamentals which influence the selection and treatment of tool and die steels.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

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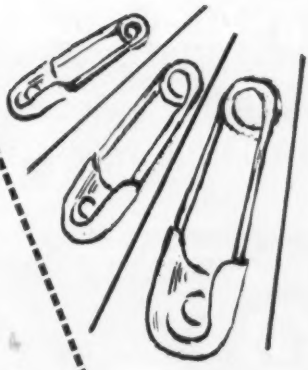

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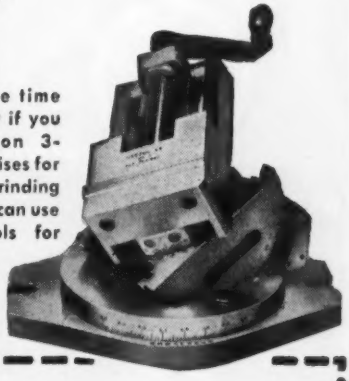

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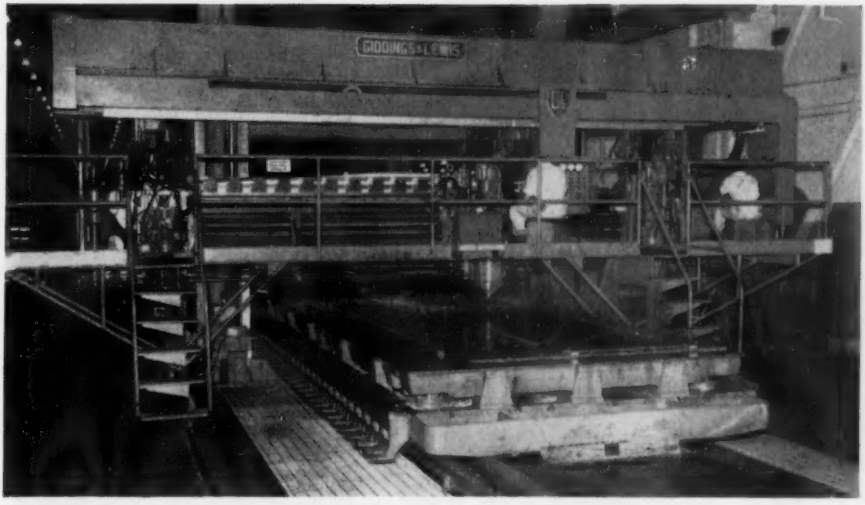
ON the following pages are detailed descriptions of many special tools which are designed primarily to enable manufacturers to obtain increased production.



Operators are able to straddle the machine's 40-foot work table through the use of a portable bridge which also serves as an ideal vantage point, placing them directly over cutter positions. In the foreground is the steel table which slides back and forth over the machine's 90-ft. protective ways. The mill stands 26 ft. high and is 30 ft. wide overall.

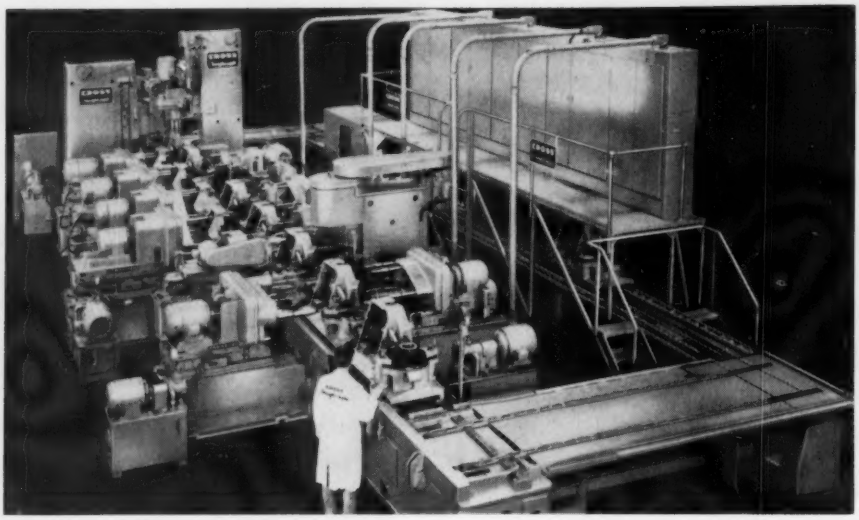
Combination Spar-Skin Mill Machines Entire Airplane Sections from Aluminum Plate

DESIGNED to machine entire sections of an airplane from thick aluminum plate 40 ft. long x 10 ft. wide, the 250-ton combination spar and skin milling machine shown herewith has begun operation at the El Segundo, Calif., Division of Douglas Aircraft Company, Inc. Designated as the G&L Hypro 100, the machine tool was built to Douglas specifications by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. It is now in use fabricating sections of the Navy's world record setting F4D Skyray jet interceptor and new A3D Skywarrior twin jet bomber.

An outstanding feature is one of the machine's three Onsrud cutting heads which is automatically guided by a template or pattern. The pattern directs the cutter's carbide teeth through the milling of an intricate airframe section at speeds as high as 7,200 r.p.m. Work is placed on a 40-ft. welded steel table which moves on rails at a speed of 150 in. a minute beneath a portable catwalk which straddles it like a bridge. Two operators manipulate the General Electric push-button control boards on the portable bridge or catwalk.

The spar and skin mill uses 12 drive motors totaling approximately 350 h.p. exclusive of 18 motors and generators delivering the power supply. A 20 h.p. motor drives the work table and smaller motors move the cutting heads on their guide rails.

Metal chips routed out by the three cutting heads are carried away at a



This special machine tool is designed to mill, drill, and tap two-speed truck axle carriers at a rate of 53 parts an hour at 100 per cent efficiency.

rate of 900 cubic inches per minute by veritable rivers of cutting fluid gushing along either side of the moving work table.

Special Machine Tool for Producing Truck Axle Carriers

A SPECIAL machine tool of the Transfer-matic type for milling, drilling and tapping two-speed truck axle carriers has been developed by The Cross Co., Detroit 7, Mich. With a capacity for both spiral bevel and hypoid type carriers, the machine processes 53 parts per hour at 100 per cent efficiency.

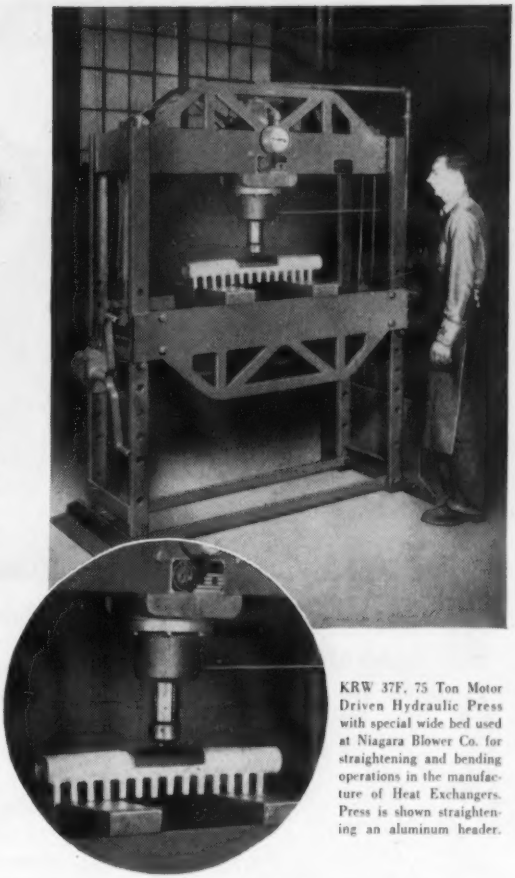
There are nine machine stations, one each for loading and unloading and seven for machining. A total of 97 operations are performed: 60 drilling, chamfering and reaming; 5 milling; 4 spotfacing and counterboring; and 28 tapping. Two-position, progressive type work-holding fixtures are transferred automatically from station to station. The fixtures are automatically returned from the unloading to the loading station by means of an integral conveyor.

Outstanding features of the machine include a cleaning unit for removing chips from fixtures between unloading and loading stations; complete interchangeability of all standard and special parts for easy maintenance; construction to Joint Industry Conference standards; hardened and ground ways; hydraulic feed and rapid traverse; individual lead screw feed for tapping; coolant system; and automatic lubrication.

Another KRW HYDRAULIC PRESS living up to it's reputation!

Like most metalworking plants, Niagara Blower Co. has a number of straightening problems in their operations — pieces that warp or bend out of shape after punching or welding. And Niagara solves these problems with this KRW motor-driven hydraulic press. It is used for straightening headers, header ends, bar irons, and other components of the company's line of heat exchangers. Niagara officials tell us that this KRW Press has really lived up to its reputation for speed, accuracy and versatility. They especially like two features of their KRW Press: the ease and accuracy with which the ram can be inched down to the work and the speed with which it converts from one set-up to another.

Let KRW help with your pressing problems. We make a full line of one, two and three cylinder Hydraulic Presses; 25-150 ton capacities; hand, air or motor-driven. Check with your Machinery dealer or write us for literature and prices.



KRW 37F, 75 Ton Motor Driven Hydraulic Press with special wide bed used at Niagara Blower Co. for straightening and bending operations in the manufacture of Heat Exchangers. Press is shown straightening an aluminum header.

ONLY KRW GIVES YOU ALL THESE FEATURES:

- **Heavy Construction Throughout.** Bed and Crown Members Truss Reinforced for Added Stiffness and Strength. A KRW Exclusive Feature.
- **Any Tonnage Pressure** up to Rated Capacity can be Obtained Quickly and Selected Pressure Locked for Repetitive Operations.
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- **Spring Return of Ram** Gives Maximum Speed on Up-Stroke.
- **Highest Quality** Radial Type Hydraulic Pump.
- **Direct Connected Motor Drive** Through Flexible Coupling.
- **Two Speed Hand Pump** also Furnished on Motor Driven Presses in this series.

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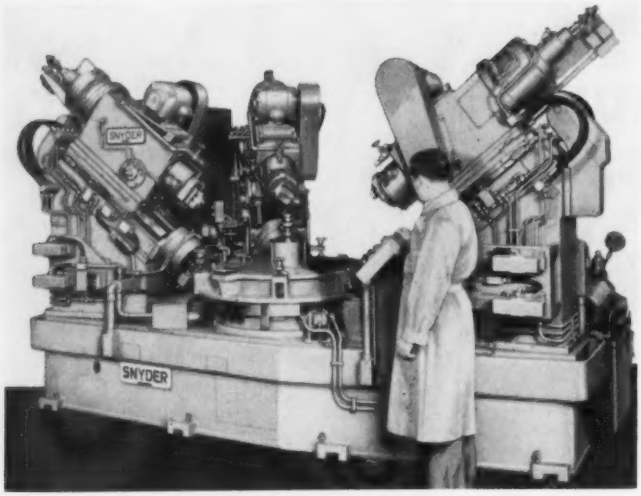
SPECIAL TOOLS FOR MORE PRODUCTION

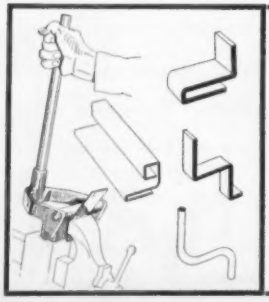


This special automatic machine performs boring and facing operations on bosses around aircraft diffuser cases.

Special Machine for Processing Aircraft Diffuser Cases

A SPECIAL machine which combines speed, precision and automation in the processing of aircraft diffuser cases has been developed by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. The workpiece is a hollow, truncated, stainless steel cone approximately 17 in. high in the center and 40 in. in diameter at the large dimension. Around the outer inclined wall are located a number of irregularly spaced bosses which are to be machined.

The machine consists of a fabricated steel base upon which is mounted an index table with three special boring and facing units mounted upon columns around it. Two of these units mount heads which are tooled to bore through a boss and then feed radially to face off the same boss. The third unit positions the head and causes radial feed of tool to face only. The slow feed rates necessitated by single point tooling are accurately controlled by the use of 12-in. diameter cylinders from which the hydraulic fluid is accurately metered. Radial actuation of facing tools is accomplished by separate hydraulic cylinders. The heads



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Fits standard machinist's vise with jaws up to 4½" width. Use it for production samples, maintenance work, experimental projects, etc.

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Wide range of uses! Grind, Rotary File, Brush or Drill merely by changing the tool. And with the new Strand Quick Change Attachment you can change tools in seconds without using wrenches, tools or special equipment. Simple press-type locking button does the trick!

Wide range of speeds! Best of all you get a choice of two four-speed ranges or two five-speed ranges when you use a *Strandflex* machine. Speeds range from 850 to 12,000 R.P.M. Change speeds without changing pulleys or drive belts by the patented Strand Gear Drive unit standard on all *Strandflex* machines. And, for an even wider range of speeds you can use the sensational new Strand High Speed Attachment that actually triples spindle speeds! *Lets you work at up to 27,000 R.P.M.'s for high speed steel or carbide cutters.*

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N. A. STRAND DIVISION

Woodberry, Baltimore 11, Md.

5001 N. Wolcott Ave., Chicago 40, Ill.

are arranged around the index table so that all bosses are machined with a minimum number of indexes.

The part is loaded into a fixture which clamps at several places on the flange on the large outer rim. The inside of the part is supported by a special expanding arbor. The fixture is mounted concentrically on a special 5-station index table which is keyed for five unequally spaced indexes. The table is driven by a fluid motor. After the part has been loaded and clamped manually, the work cycle is automatic as follows: Two units operate and bore and face two bosses; table automatically indexes and again two units operate and bore and face two bosses; table indexes three more times and each time, a single unit operates and a facing operation is performed. The fifth index brings the table back to original position where the part is unclamped and unloaded.

Heads are provided with adjustable sheaves to permit variation of spindle speeds. Tools are tungsten carbide rotating at 50 feet a minute with 0.15-in. a minute infeed. Coolant is supplied from a pump and tank on the rear of the unit.

The base is of welded steel construction. Necessary floor space is 95 x 160 in., including coolant tank.

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The NEW MODERN AUTOMATIC

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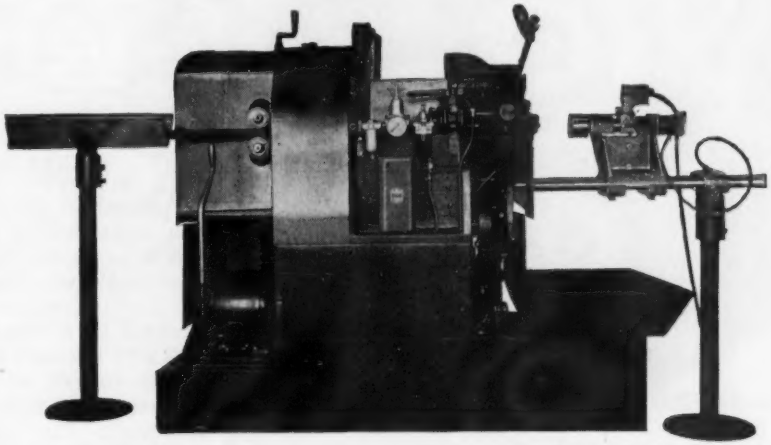

Cuts Off Tubing, Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off *any length you want*—and cuts it *faster*. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

½" Tubing
This machine cuts off and chamfers both outside edges of ½" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

1¼" Cold Rolled
This machine cuts off and chamfers both ends of 1¼" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing
This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

These popular, time saving machines are now available in four sizes, handling work up to 6¾" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

4" Threaded Studs

Cut and chamfered at one time—in 8 seconds—from 10 ft. length of stock already threaded. (¾" U. S. Standard.) Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

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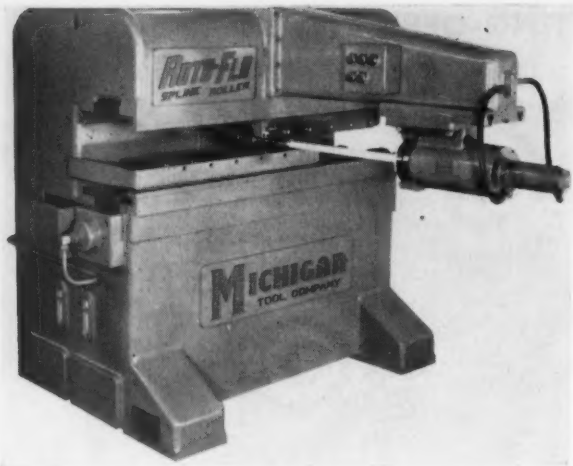
MODERN MACHINE TOOL CO.

Jackson, Michigan



Roto-Flo Spline Roller Model No. 1525 will roll form splines, oil grooves, serrations, and other similar shapes in shafts. Automation is easily adapted to the spline roller to take advantage of its high production potential.

Rolling Machine Is Specially Designed to Increase Spline Production

A BASIC new process for producing splines, oil grooves, serrations, and other similar shapes on external parts has been announced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The machine making the process possible is known as the Roto-Flo Spline Roller and is made in three sizes.

Rolling splines or similar shapes on the Roto-Flo Machine is a cold working process in which the metal shaft is placed between the forming racks and emerges in a few seconds with the teeth completely formed at any desired position along the shaft. The resulting splines have a high degree of accuracy along with excellent surface finish. Since the metal is displaced and not removed, parts are usually made to the pitch diameter before forming.

Another outstanding design advantage of the process is that teeth have been formed all the way up to a protruding shoulder diameter. Since a recess for tool clearance adjacent to the shoulder is not required with the Roto-Flo method, and the shoulder is not damaged in any way, maximum strength and high quality bearing sur-

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Supplied in one Superior Accuracy
5 MILLIONTHS ± ACCURACY
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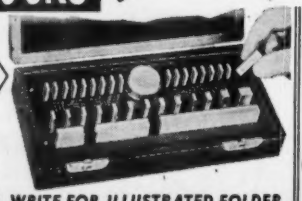
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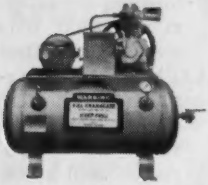
Two great names team up to eliminate "busy-door" bottlenecks



• WESTINGHOUSE AIR COMPRESSORS

The compressor plant shown here was selected by Stanley as the most economical and efficient to operate their Magic Doors. Whether your air requirements are large or small, there's a Westinghouse Air Compressor in the proper size to handle the job.

• Doors are necessary but when they slow down traffic and interrupt the smooth flow of materials and parts, they become costly. Here Westinghouse and Stanley team up to eliminate such bottlenecks. Stanley Magic Door Controls open and close doors automatically. But, they require a dependable source for regulated air pressure . . . this is supplied, in thousands of installations, by Westinghouse Air Compressors.

The Westinghouse Air Compressors are set to operate between 60 and 80 lbs. of pressure. When the pressure drops below the lower limit, the motor starts, builds up pressure to 80 lbs. and automatically shuts off. This reserve air supply, and the dependability of the Westinghouse Air Compressor assure the air you need when you need it.

Westinghouse Air Compressors come in a variety of sizes to meet every type of air requirement. For more information about Westinghouse Air Compressors call your local dealer.

Westinghouse Air Brake COMPANY

INDUSTRIAL PRODUCTS DIVISION WILMERDING, PA.

Manufacturers of air compressors, pneumatic cylinders, actuators, air control devices, engineered pneumatic control systems and front end loaders.

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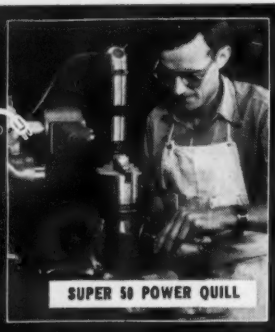
faces are said to be obtained.

Indicative of production time advantages is the following case history: Splined shafts of 1⅛-in. diameter and 1¼-in. length were formed in 3 seconds. The return stroke, with machine empty, took 2 seconds. Automatic handling of parts will take less than 4 seconds. Complete cycle for many parts is less than 10 seconds. The above parts were rolled from S.A.E. 1037 steel ranging in hardness from annealed to 41 Rockwell "C" scale. The finish obtained was 3 to 6 microinches. The accuracy was within 0.0008-in. variation from part to part over pins.

The basic components of the Roto-Flo Machine, besides the rack-type forming tools, are two slides and an extremely heavy C-shaped machine frame. The two slides, holding the forming racks, are mounted one above the other. The slides are geared together with master racks (not the tool racks) and a connecting gear. The lower rack is the prime mover and obtains its power from hydraulic cylinders.

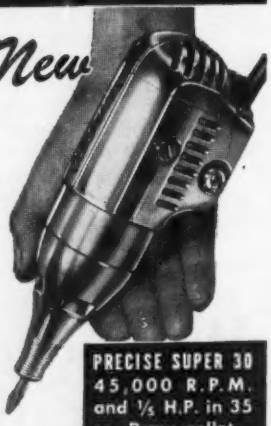
Tool racks are adjustable toward the part center to obtain proper size, and are also adjustable endwise to obtain correct relationship with the part axis. Parts to be formed are positioned between the forming racks. They

Precise®
LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



UP TO 45,000 R.P.M. AND ¼ H.P. ON AC/DC. Only PRECISE has the speed, power and precision needed to turn *Tungsten Carbide Mills* as well as all other rotary tools with shank diameters to ¼". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups; PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.

New



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45,000 R.P.M.
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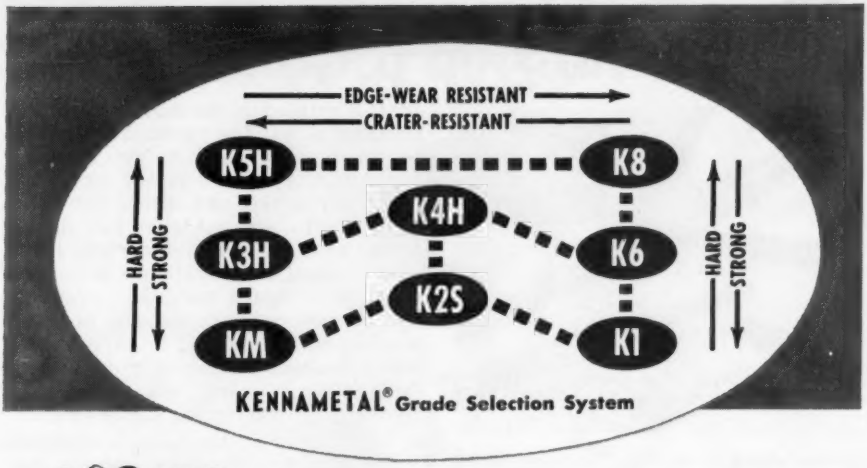

NOW- A Quick, Easy-to-Use Guide to Efficient Machining

Here's the first simplified system for selecting carbide tool grades. Kennametal's new grade selection method assures top tool performance on every machining job. It's easy to use and eliminates guesswork because grades are grouped according to their wear characteristics (edge-wear and crater-resistant); also according to relative strength with strong, intermediate and hard grades included in each group. These eight Kennametal grades meet all machining requirements.

Kennametal's grading system is unmatched in the industry for simplicity. Any experienced machinist can use it to quickly adjust grades for better tool performance. For example: If K3H is being used and crater is no problem, a switch to K4H, which is more edge-wear resistant, will provide longer tool life. Conversely, if K4H is being used and crater is excessive, a switch to K3H would improve tool life.

Your Kennametal representative will gladly help you apply this grade selection system to your machining operations. He can also help apply these eight grades to "wear spots" in your product, your processing lines, or any place a hard, wear-resistant metal is needed. Just give him a call. Kennametal Inc., Latrobe, Pa.

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CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES

A-15

Splines formed by the Roto-Flo process in an average of 3½ seconds' forming time. The splined shafts range from ⅞ to 1⅝ in. outside diameter. Length of splines ranges up to 1¾ inch. Note helical splines at left center and straight splines at top center are formed adjacent to protruding shoulders.

are supported between centers or by other suitable methods, so that the shaft is rotated by the movement of the forming racks. The racks are designed to press deeper and deeper into the parts as they roll together until full depth is reached, and then a few additional turns are made at full depth. Racks are made of high-carbon, high-chrome steel. Rack teeth are ground on a special machine designed to provide extreme accuracy in spacing, pressure angle, helix angle, and so on. An automatic coolant system is provided for cooling the forming racks and splines under mass production conditions.

The Roto-Flo Machine is equipped with a safety interlock system that will not permit the forming racks to return until the workpiece has been removed. Also, the working stroke is held up automatically until the part to be splined is properly located between the head and tailstock and the operator's hands are out of danger.

Solve Sludge Problem With Nicholson's

New **AIR TRAPS**

With the introduction of a new oil-eliminating feature, Nicholson air traps enable you to enjoy the advantages of the positive intermittent action of a float-operated air trap without the common problem of oil congealing on the mechanism and impeding or stopping its action. Three types; pressures to 1500 lbs. For details send for...*Cat. 953*

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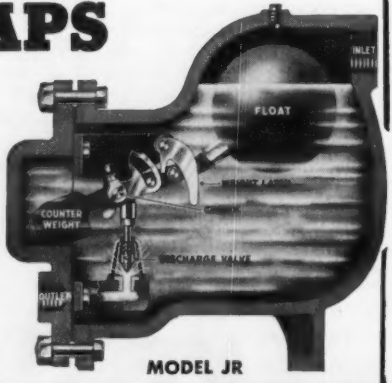

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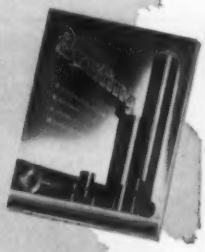

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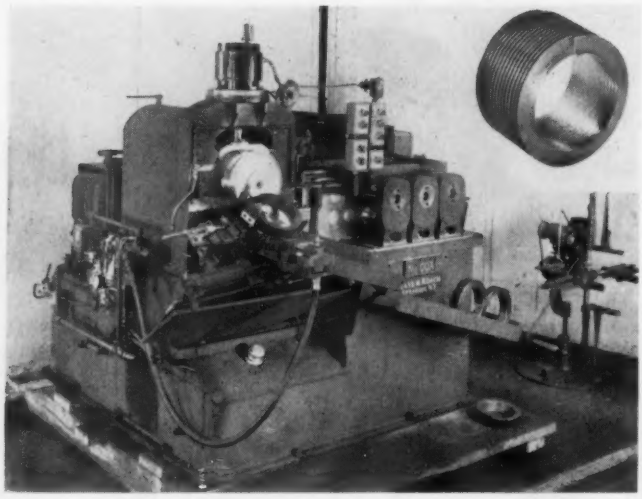
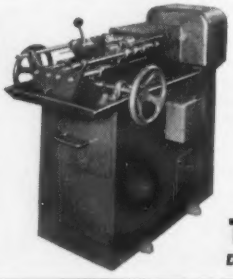


This cold roll forming machine with coiler and cutoff is specially adapted for producing cooling fins used on sealed refrigerator compressor units.

Machine Is Specially Adapted for Producing Compressor Cooling Fins

THE K & R No. 00X Cold Roll Forming Machine with No. 2LS coiler and cut-off illustrated herewith, product of Kane & Roach, Inc., Syracuse, 4, N. Y., is arranged for producing cooling fins used on sealed refrigerator compressor units. A finished product is shown in the discharge chute of the machine and also in the upper right-hand corner of the illustration.

Stock is taken from a coil approximately 1 ⅜ in. wide x 0.004 in. thick, and parts are produced at the rate of 300 per hour with 5½ turn coils. The sequence of operation is as follows: (1) form strip into a ⅜ x 1¼-in. angle section; (2) coil the formed angle into 6 31/32-in. inside diameter coils; and (3) automatic cutoff of the completed fin coils of 5½ turns per coil. The cutting stroke of the shear is activated by a single-acting hydraulic cylinder and returned by spring action. A Cyclomonitor controls the number of rings per coil, and the cutoff is adjustable for coil diameter.



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OF SCREW BLANKS AND SIMILAR PARTS
The KENT 2-Spindle BOLT THREADER
Alternate feeding to two spindles. Continuous operation. Large output. Low Costs. Change-overs made quickly. Minimum skill required.
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an ACCO product

Wilson "Rockwell"* Hardness Testers

SET-O-MATIC* DIAL GAUGE

• Eliminates human error. Operator merely applies minor load and taps depressor bar. No setting of dial to zero.

OTHER FEATURES

- Major load applied under dash pot control
- Major load removed by motor
- Illuminated Dial Gauge
- Illuminated Penetrator

Eliminates Operations... Increases Tests per Hour

All you have to do with the Model Y WILSON "ROCKWELL" Motorized Hardness Tester is apply the minor load and tap the major load depressor bar. The machine does everything else automatically. The cycle of Major Load operation may be less than 2 seconds.

This speed of test means great savings in time which will reduce your hardness testing costs. Yet it is done to Wilson's high standard of accuracy.

The Model Y Motorized WILSON "ROCKWELL" Hardness Tester is in production and orders are being accepted for early delivery. Write today for literature and prices.

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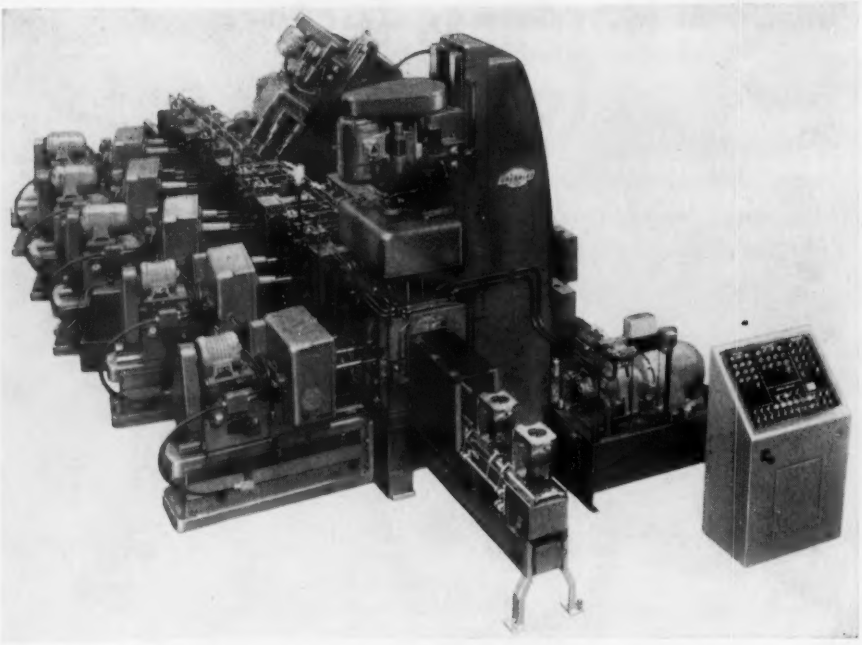

The 17-station transfer machine shown herewith is the second machine in an automatic production line of four transfer machines designed for machining automotive transmission cases.

Transfer Machines Are Specially Designed for Machining Automotive Transmission Cases

AN automatic production line of four transfer machines has been built by Greenlee Bros. & Co., Rockford, Ill., for machining automotive transmission cases. All four transfer machines combine the facilities of 247 tools to complete 265 operations in 29.5 seconds, averaging 122 cases per hour at 100 per cent efficiency. The 17-station transfer machine shown in the accompanying illustration is the second machine in the line. It performs drilling and reaming operations on the bottom, top and end of the transmission cases.

Outstanding features of these machines include safety devices for the protection of the operating personnel and the machine. Steel mesh guards are provided on and between each working station and are hinged to allow easy access to the transmission cases for inspection and removal. All guards are electrically interlocked, permitting the machine to run only when all the guards are locked down. Each machine is equipped with an easy-to-reach emergency cord for stopping the machine from any position

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GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more!* Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.
Complete with Foot Control Valve, Air Hose and Fittings . . only **$36.00**

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AIR REGULATOR
Precision-built. Delivers pressures up to 140 lbs. With gauge, $5.95. Less gauge, $3.25

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Keeps water and particles out of the regulator and pneumatic tools. $3.00

BLOW-GUN
Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . . $3.00

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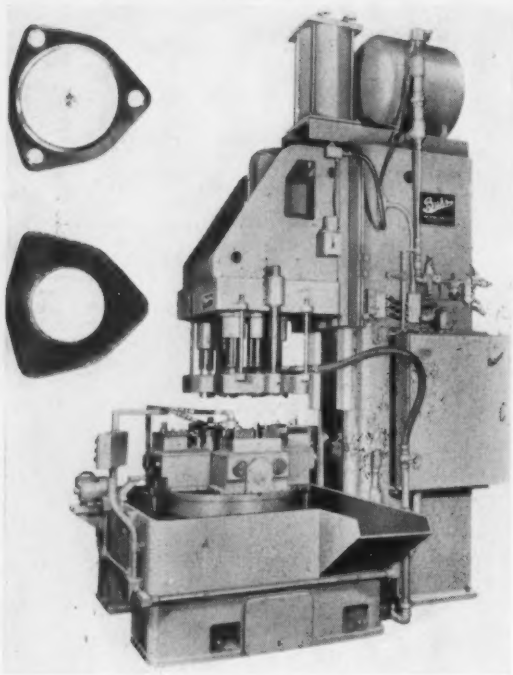


This special vertical multiple-spindle machine featuring an air-balancing system is tooled to bore, drill and chamfer two automotive steel flanges at a time at a rate of 329 pieces per hour gross.

along its entire length. All functions of the machines are hydraulically operated and electrically interlocked, and any malfunction is readily detected and the trouble located immediately by a system of lights mounted on the operator's control cabinet.

Special Multiple-Spindle Machine Features Air-Balancing System

BUHR Machine Tool Co., Ann Arbor, Mich., has developed for the automotive industry a special vertical multiple-spindle machine featuring an air-balancing system that operates at 50 lb. line pressure; a storage tank cuts air consumption to a minimum. The machine, which is fully equipped with a safety device to guard against air failure or creepage during idleness, is designed to bore, drill and chamfer two automotive steel flanges at a time at a rate of 329 pieces per hour gross. The holding fixture, mounted on an automatic index table, is arranged with hydraulic clamping.

To obtain maximum efficiency, the parts are clamped while the fixture moves from the loading station to the first work station, and are unclamped during return from the final work station to the loading station of the machine.

Special-Built Machine for Broaching Automotive Bearing Caps

HIGH speed broaching of the locating faces on automotive bearing caps is being accomplished on a special-built horizontal broaching machine introduced by Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13, Mich. Parts are being broached at the rate of 480 per hour with this semi-automatic machine featuring

NEW "InteRapid"

★ Complete Unit

★ Accurate

★ Quick Setting

★ Easily Read

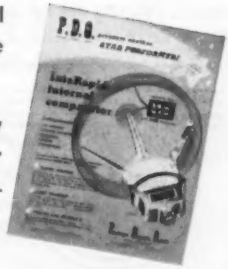
★ Precision Made

★ Guaranteed

New Internal Comparator Gage has gaging capacity from 3/8" diameter to 6" diameter. Meter-type scale, graduated in .0005", shows at a glance whether holes are oversize or undersize and by exactly how much.

Gage is designed for use on Jig Bores, Boring Machines, Internal Grinders, Lathes and for all Inspection Personnel.

For complete details . . . write for Comparator Specification sheet.



PORTAGE Double-Quick TOOL CO.

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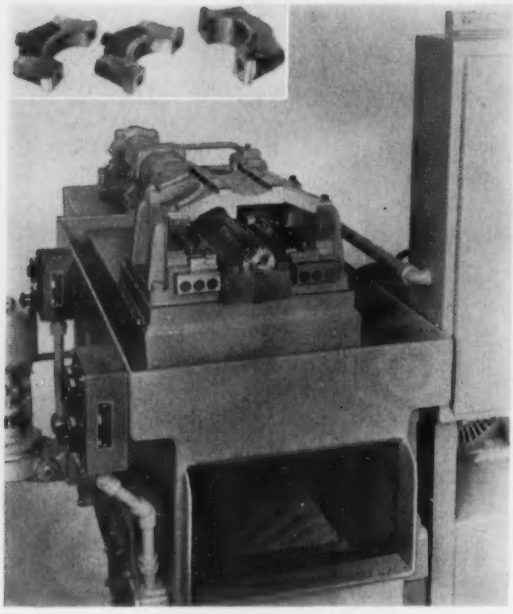
SPECIAL TOOLS FOR MORE PRODUCTION



Locating faces on automotive bearing caps are broached at the rate of 480 per hour on this special-built horizontal broaching machine. Two stationary insert-type broaches, both of which are adjustable, remove 0.0045 in. of stock with each cutting pass. Note the special fixture that guides the cap as it is pushed through the stroke. The fixture may be inverted for broaching different sized caps broached on the Colonial HB1. Locating faces on the two outside caps have been broached, while the center part is unfinished.

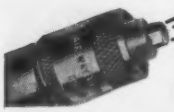
two adjustable stationary insert-type broaches.

Colonial's Model HB1 is a 4-ton machine having a 12-in. broaching stroke traveling at the rate of 30 f.p.m. Maximum return speed is 60 f.p.m. The fixture is interesting in that it does not clamp the part but guides the bearing cap as it is pushed past the stationary broaching teeth by the ram. Three caps of different sizes are machined on the HB1 while using the same fixture. Two of the caps are broached with the fixture located as shown in the accompanying illustration. By merely removing four holddown bolts, the fixture can be quickly and easily inverted, and in this position is designed to perform its mechanical guiding function for the bearing cap with the greatest thickness.

Air-O-chek GUN

COMPRESSED AIR ECONOMY

In machine shop and foundry clear away chips, dust, dirt and surplus material quickly . . . AND SAVE through low initial cost, superior performance, low maintenance. Air-O-chek air guns are of simple design, sturdy construction and are easy to use.



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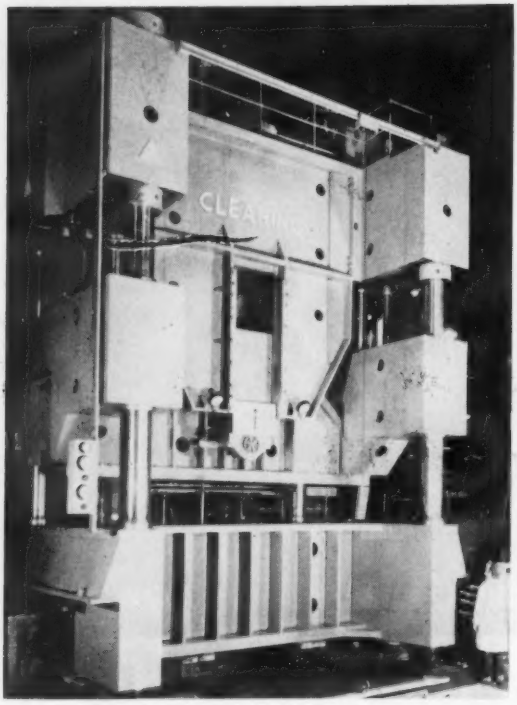


This mammoth keel bender press is designed to form steel plate many inches thick to the contours of keel and hull and makes possible the holding of shape to minute tolerances.

Keel Bender Press Forms Steel Plate Several Inches Thick

CLEARING Machine Corp., 6493 W. 65th St., Chicago 38, Ill., recently completed a mammoth keel bender press which is used in the construction of ocean-going vessels. The keel bender forms steel plate many inches thick to the contours of keel and hull and makes it possible to hold shape to minute tolerances. The machine has a walking beam which can exert a total of 1,800 tons vertically and can also rock on a central axis. Maximum pressure exerted by each end is 900 tons. The beam is pivoted in a pair of guided slides through two spring-centered levers which permit the beam to move horizontally 1½ in. to either left or right of center This movement enables the operator to hold pressure on one end while lowering the other end of the beam, effecting a rolling action of the moving beam die over the work.

The maximum tilt or "slew" is 30 in. in the 20-ft. length of the walking beam. Pressure delivered to each moving member is independently controlled at the control panel mounted on the left side of the press.

Special Gage for Measuring Bearing Radial Play

A SPECIAL constant-load gage designed to measure assembler roller and ball bearings for radial play between the outer and inner races has been developed by Federal Products Corp., 4145 Eddy St., Providence 1, R. I. A dead-load pressure is used so as to provide a constant pressure on the races. Air is used to relieve the weight pressure while inserting the bearing. Weights can be made to suit user requirements. Fully adjustable to measure three sizes of assembled bearings ranging from 1 to 5-in. outer race o.d., this gage can be modified to check any

This little red wagon presented a big drawing problem!

A Standard engineer's advice helped cut rejects by over 90%!

Die cleaning is of major importance. A single scratch can result in ruined bodies. STANICOOL HD safely reduces time-consuming die cleaning to a minimum.

■ The Steger Products Manufacturing Company of Steger, Illinois manufactures children's wagons. Of the 8-hour shift capacity of 1600 to 1800 wagon bodies, up to 20% formerly wound up as rejects and the dies had to be cleaned after every 10 to 15 bodies.

Six years ago a Standard Cutting Oil Engineer recommended STANICOOL HD. Today it's still on the job—the reject rate reduced to less than 10 a day. Die breakage is down to almost nothing; dies are cleaned only once or twice daily. Again, Standard Oil's metalworking products prove they can do the hard jobs better!

STANICOOL HD Soluble Oil—for cutting and grinding operations and for certain forming operations. Mixes readily, non-irritating, anti-rust. Call on the services of your Standard Oil Cutting Oil Engineer. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

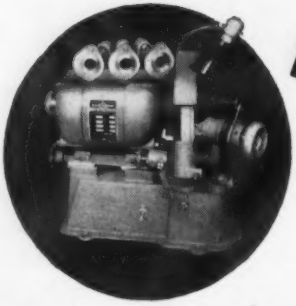
STANDARD

STANDARD OIL COMPANY
(Indiana)

bearing size within that range, or to handle larger or smaller bearings.

To use the gage, the operator slips the bearing over a hardened steel pressure shoe in the center of the open bearing nest and closes the latter with the cam lever. When the left-hand lever is pulled, the pressure shoe exerts a predetermined downward pressure on the bearing; a vibrator settles all balls or rollers in their races, and the operator reads the dial indicator reading. The operator then releases the left-hand lever and pulls the right-hand lever. The pressure shoe exerts a similar upward pressure; the vibrator settles the balls or rollers, and the operator notes the new indicator reading. The difference between these two readings, shown in increments of 0.0001 in., is the amount of radial play of the assembled bearing.

This special constant-load gage is designed to measure assembled roller and ball bearings for radial play between the outer and inner races.



THE ONLY DRILL GRINDER SO FAST & EASY TO OPERATE!

Only the *Black Diamond* Drill Grinder lets you sharpen small drills accurately by such a simple grinding method. Fast, easy operation. No complicated adjustments. Compare these outstanding features:

- Exclusive "positive-positioning" assures accuracy!
- No skill required by operator!
- Both lips ground in one operation!
- Web thinning made easy with special attachment!

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BLACK DIAMOND SAW & MACHINE WORKS, INC.

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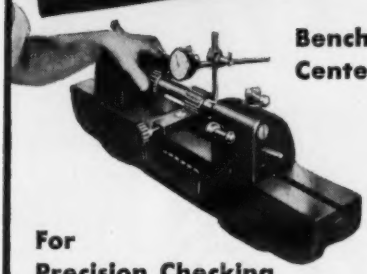
Time Saving Production and Checking Accessories

Here are three Sundstrand accessories that may prove helpful in your work. A wide range of bench centers and balancing tools are available for checking purposes. The automatic index base has proved a sound addition to many metal working machines. Write for further information.



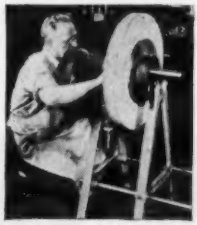
Bench Centers For Precision Checking

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

COMPLETE RANGE AS FOLLOWS:

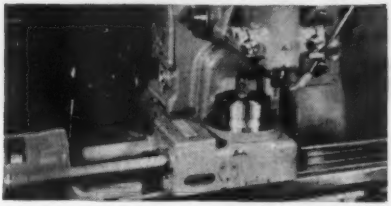
6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

Balancing Tools For Small Medium or Large Work



Sundstrand offers a complete line of balancing tools which will save their cost quickly on truing or balancing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears shafts, fly wheels, pulleys, etc. Standard swing sizes range from 21 inches up to any swing desired. Length between standards ranges from 20 inches to any length desired.

Automatic Index Base For More Production



This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

In many cases, the addition of this Automatic index base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this.

Free Data

Complete specifications are available on these three time saving accessories. Write for your copies today. Ask for bulletin 546.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.

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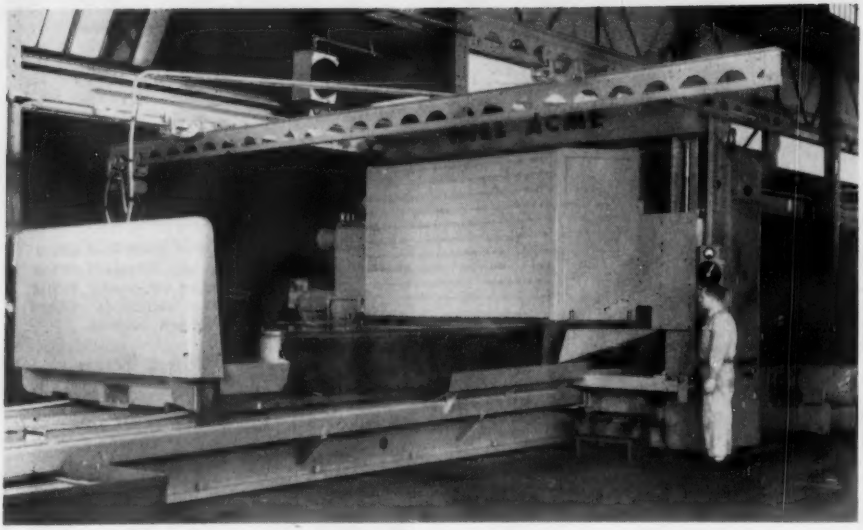

This double housing abrasive belt taper grinding machine with 84 in. wide x 16-ft. long hydraulically operated table is specially adapted for grinding flat and tapered aluminum aircraft wings and fuselage skins.

Huge Precision Abrasive Belt Grinder for Aircraft Tapered Skin Production

A HUGE double housing abrasive belt grinder utilizing extremely wide endless factory coated abrasive cloth belts (138 in. long x 86 in. maximum width) for grinding flat and tapered aluminum aircraft wings and fuselage skins has been completed by The Hill Acme Co., 1201 W. 65th St., N. W., Cleveland 2, Ohio. The grinder as illustrated is powered with a 250 h.p. d.c. motor, and the positive hydraulic reciprocating table drive of this unit permits instantly variable speeds. Heavy grinding as well as finishing is

LUERS
PATENTED CUTTING OFF TOOL HOLDERS
PATENTED CUTTING OFF BLADES
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
Manufactured by
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JOHNSON BAND SAWS

BOTH WET AND DRY MODELS

SPECIFICATIONS—MODEL J

Capacity—10″ rounds, 18″ flats
Motor—½ H.P. Ball Bearing any voltage available, single or polyphase (¾ H.P. on wet machine).
Wheel Diameters—16″.
Floor Space—66″ x 31″.
Bed—11″ wide, 44″ long, 6″ deep, 24″ high.
Overall Height (Closed)—39″.
Blade Length—11′5″ x ¾″ x 032″ All Standard blades of these specifications can be used.
Weight—Approximately 750 lbs. Crated 800 lbs. Boxed for export 875 lbs.
Speeds—35, 90, 130, 190 feet per minute.
Casters—Optional at slight extra cost.

MODEL B, 5″ x 10″ CAPACITY ALSO AVAILABLE

WRITE FOR DETAILS

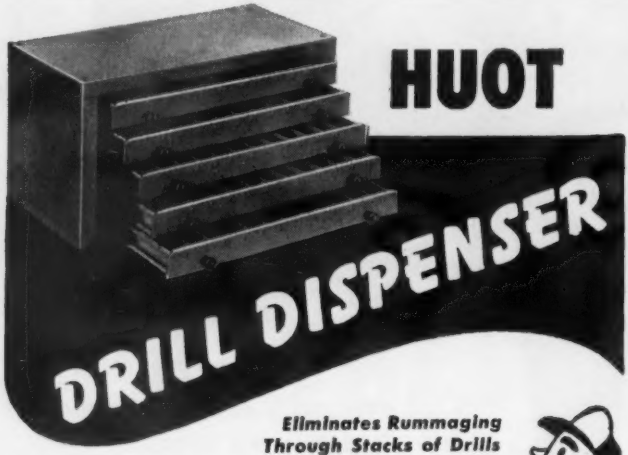
JOHNSON MANUFACTURING CORP.

ALBION, MICHIGAN

performed by using waterproof cloth abrasive belts together with a coolant.

The machine is constructed of extra heavily ribbed welded steel components, except for the massive semi-steel columns that support the entire grinding head assembly and the bed and table ways which are also semi-steel. The hand scraped cast ways are securely "keyed" to both the table and the bed, thereby ensuring accuracy. The "V" and flat ways are pressure oil lubricated and fully protected with canvas way covers to eliminate any possibility of scoring. The entire grinding head assembly is accurately fitted to the semi-steel column ways which are machined and hand scraped.

The "Hill" Double Housing Taper Grinding Machine is equipped with two motors for the vertical operation of the entire abrasive belt grinding head assembly. A 3 h.p. constant speed motor connected by means of a gearbox to the elevating screws raises and lowers the entire grinding head assembly at the rate of 5 in. per minute and is likewise used for initially positioning the abrasive belt over the work. The other motor is a 1 h.p. geared motor which is connected by means of a magnetic clutch to the elevating screws. This motor is used for



Eliminates Rummaging Through Stacks of Drills

No more running out of drills—your entire stock can be seen at a glance. Each size of drill has its own compartment with rounded bottom for easy selection. You can store dozens of small drills and several large ones in their own compartments. Built-in pricing or inventory system eliminates the need for cost sheets, and will keep a record of drills on hand. Stack two or three cabinets to save space. Specifications: 14½" long, 7¼" high, 7¼" deep. Hammerlin baked enamel finish over rugged steel. *Write for bulletin.*

Made in three models for fractional, number or letter drills.

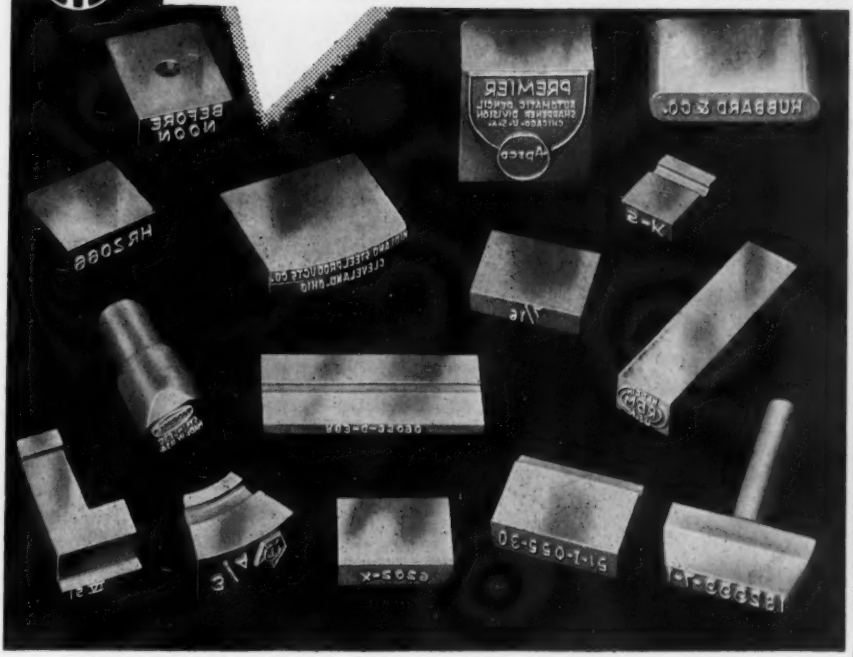
"HUOT" is pronounced "HEW-OT"

HUOT MANUFACTURING CO.

538 N. Wheeler St., St. Paul 4, Minn.

By the makers of **HUOT DRILL INDEX**

SHARP PERMANENT MARKING
WITH HI-DUTY MARKING TOOLS



For legible permanent marking of metal components use engraved lettering tools. Precision engraved dies and inserts for indenting or embossing identification on your parts will

1. Improve appearance.
2. Advertise throughout life of part.
3. Facilitate reordering.

COMPLETE MACHINE FACILITIES TO PRODUCE

- Hand Stamps
- Engraved Inserts for Dies
- Shank Style Stamping Dies
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- Code Stamps
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- Numbering Heads
- Marking Machines
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Write for free catalog on Production Marking Equipment.

GEO. T. SCHMIDT, INC.
1806 West Belle Plaine Avenue
Chicago 13, Illinois

accurately positioning and feeding the abrasive belt into the work, and precision setting within 0.00025 in. is said to be readily accomplished. A large indicator on the front of the machine accurately records the depth of the cut being taken in thousandths of an inch.

A full coverage vacuum chuck is used to securely hold the work. The chuck is equipped with a special gasket to conform to the various shaped wings and fuselage sections that are to be ground. Any portion of the vacuum chuck may be used at any time and the unused part can be automatically sealed off.

The 84-in. wide x 16-ft. long table of the machine is reciprocated by means of two opposed pistons and cylinders together with low pressure hydraulic pumps. These pumps, together with the necessary valves for starting and stopping, as well as reversing and changing from high to low table speeds, are all located in a self-contained steel tank for accessibility and cleanliness. All controls to start, stop, reverse, change speed and run the table out to the loading position are located in a panel on the front of the machine. Bleeder lines for hydraulic cylinders are used to maintain a constant and uniform action of the table.

Model 8C's smooth, clean-cut design eliminates the multitude of clothes-catching, dirt-catching and knuckle-barking projections common to conventional metal cutting band saws.

AN ALL-NEW DESIGN . . .

FIRST TO MEET TODAY'S METAL CUTTING NEEDS!

You'll get performance never before available when you get the ALL-NEW Model 8C band saw. Designed to meet your metal cutting needs today—and for a *long time* to come—Model 8C embodies years of *Kalamazoo* experience in the field and the best industrial design talent.

Once you've *seen* the new 8C, you'll agree it has everything you've been looking for in an 8-inch metal cutting band saw. Ask your dealer for a demonstration *soon*—or write today for descriptive literature and the name of your dealer.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

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has won favor throughout industry as one of the most efficient methods of imparting extra wear to the surfaces of gages, parts and tools.

This method employing the Linde Process applies a thin wear-resistant coating of tungsten carbide in wearing surfaces to extend the life of gages and hundreds of tools many times over.

Carb-O-Plating gives you wear life of carbide at a cost substantially lower than the use of solid material can give you. And because of the steel base, the products have resistance to mechanical shock and are not subject to breakage as can occur with sintered carbide. Carb-O-Plating also increases accuracy.

If you don't know about Carb-O-Plating, you're missing many advantages. Let us explain.

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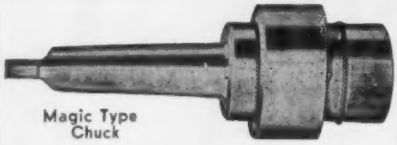
CARBIDE ROTARY FILES • ALSO FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION

SPECIAL TOOLS FOR MORE PRODUCTION

Air Gage Is Specially Designed for Checking Jet Engine Airfoil Strip Stock

AN air gage for inspecting jet engine airfoil strip stock for thickness, width and camber at a rate of 300 ft. per minute has been developed by The Sheffield Corp., Dayton 1, Ohio. Two motor drive rolls are used to move the stock through the gage, and a variable two-speed transmission controls the speed of the rolls. Movement of the

This air gage is specially designed for inspecting jet engine airfoil strip stock for thickness, width and camber at a rate of 300 ft. per minute.


Magic Type Chuck

THE COLLIS

MAGIC-TYPE CHUCKS

Reduce production costs with Collis Magic Chucks. Now tools can be changed without stopping or slowing down the spindle. Boring, counter boring, drilling, reaming, tapping, etc., can be performed practically continuously.

Let our 40 years of manufacturing experience help your customers select the proper equipment for the job.

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Buy safe "SHUR-GRIP"

drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes remolding easier, quicker, surer, less expensive.

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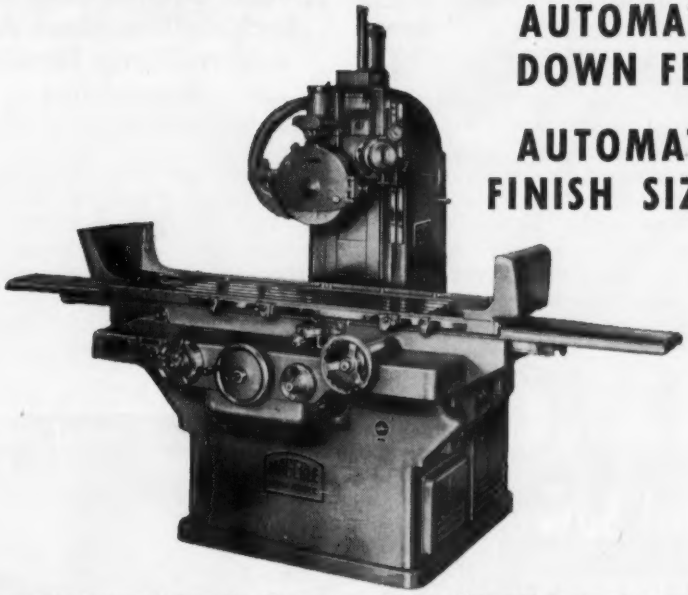


- A work measuring instrument shows the difference between work size and required final size during operation.
- The automatic feeding and sizing is powered by a separate electrical unit.
- The built in diamond wheel dresser automatically resets the final sizing mechanism for wheel wear.
- The machine requires no attendance during the grinding operation.
- Finishes within .0002 are secured on repeated chuck loadings automatically.
- Rapid traverse is provided for both head and cross-slide.
- Furnished with heavy duty cartridge spindle assembly.
- Available with infinitely variable grinding wheel speed.
- Extremely rugged construction and very easy to operate.
- Available in 2 foot, 3 foot and 4 foot models.

Write for our eight page illustrated brochure.

PELLOW MACHINE CO.

13500 FOLEY AVENUE • DETROIT 27, MICHIGAN

stock may be stopped and reversed at any time, thus enabling the operator to reinspect any section.

The gage is 33 in. wide x 31 in. deep and has a 12-column Precisionaire at eye-level height. Interchangeable and adjustable tooling is provided to permit checking of four different widths of stock. As the metal stock passes through the gaging station, thickness is gaged at five places and width at one, with Plunjet gaging cartridges. The amount of camber in any 12-in. section of stock is gaged by a Plunjet located midway within this length.

During gaging, the operator watches the positions of the floats in the Precisionaire columns to determine whether the dimensions and conditions are in tolerance or how much they are out of tolerance. Minimum and maximum tolerance lines inscribed on the plastic plate or "Airechart" facilitate determining at a glance whether the stock is in or out of tolerance.

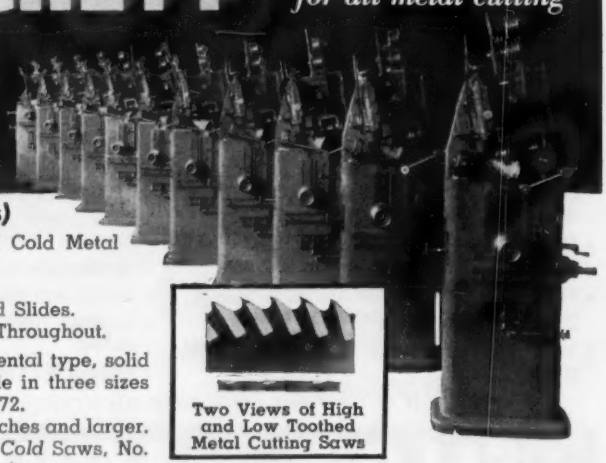
Special Double-End Boring Machine Processes Automotive Pump Housing Assemblies

THE double-end precision boring machine shown herewith was recently delivered to one of the larger automobile companies by Peerless Production Co., 19449 Glendale Ave., Detroit 23, Mich. The machine features a hydraulically actuated cross-slide, with high precision assured by a power-operated mechanical take-off device

HANCHETT

for all metal cutting

Metal Saw Sharpeners



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For Automatic Grinding of Cold Metal Saws.
Rigid — Accurate — Fast.
Ball Bearing Mounted Head Slides.
Heavy Duty Construction Throughout.

For inserted tooth, segmental type, solid tooth circular saws made in three sizes —Models 1130, 1160, 1172.
Saw capacities 8 to 72 inches and larger.
Other Models—Hot and *Cold* Saws, No. 12 and No. 572 (all sizes).

Two Views of High and Low Toothed Metal Cutting Saws

HANCHETT MANUFACTURING COMPANY
World's Largest Manufacturers of Shear Blade, Knife and Saw Grinding Machinery
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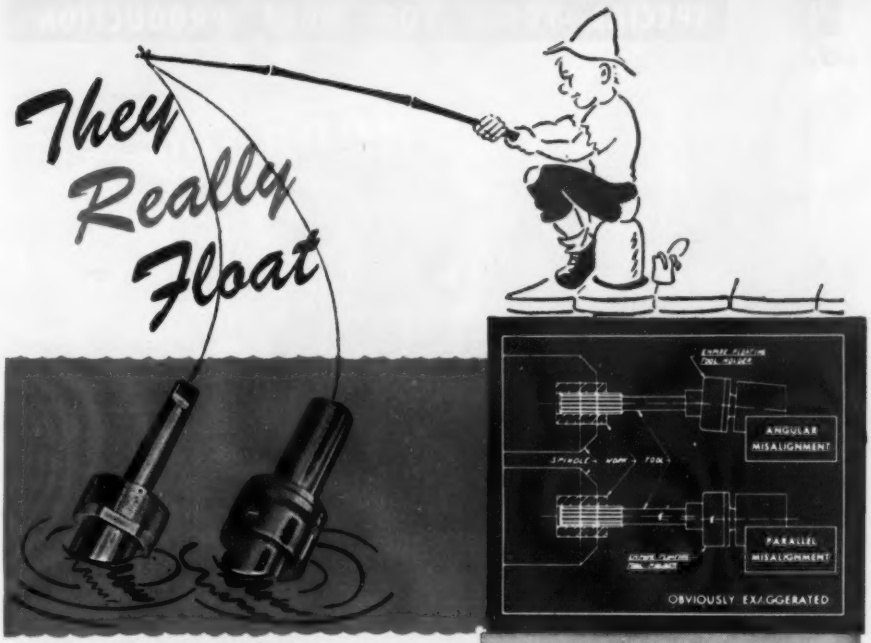
They Really Float



EMPIRE FLOATING REAMER HOLDERS *and* EMPIRE FLOATING TAP HOLDERS

And we do mean float! These floating reamer and tap holders compensate for both out-of-parallel and angular misalignment and permit tap or reamer to float freely—in and out—and will not freeze under tension caused by drag.

By referring to the drawing you will note that the sleeve and shank float independently of each other—achieving a free and easy movement—a unique engineering design not found in any other floating tool.

With the Empire Floating Tool Holder you'll have no more bell mouths or over-sized holes. Holes can be reamed to close tolerances.

Ask about the Floating-Releasing Tap Holder

—that corrects for both parallel and angular misalignment

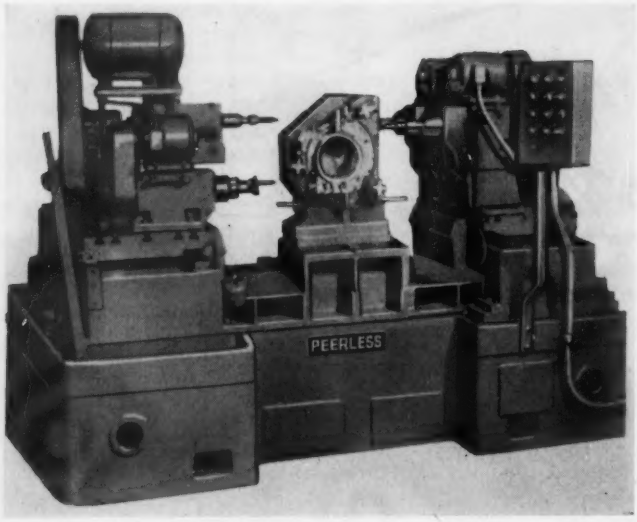
—that will not strip threads when tap is pulled out

—that permits adjustments of float to threading—right or left hand.

EMPIRE TOOL COMPANY

8774 GRINNELL AVE. DETROIT 13, MICHIGAN

SPECIAL TOOLS FOR MORE PRODUCTION



This special double-end precision boring machine is designed to process 30 automotive pump housing assemblies an hour at 100 per cent efficiency.

which also clamps the slide in position during the machining cycle. This precision positioning device permits the boring of close-center-distance holes in a single setup without sacrificing the benefits of one-time-part fixturing and the desirable longitudinal platen travel feature.

Designed and built to process pump housing assemblies, this specialized production equipment performs boring, chamfering and trepanning operations to precise specifications. It trepans one groove 0.062/0.072 in. wide x 0.049/0.054 in. deep; taper-bores 0.250-in. taper per foot; bores a hole 0.437/0.436 and 1.1255/1.1250 in. in diameter; bores another hole 2.410/2.408 in. in diameter; and then performs a 0.060-in. 30-deg. chamfering operation before finishing with a 0.191/0.191-in. ream. Thirty pump housing assemblies are said to be processed in this manner in a single hour at 100 per cent efficiency. All special perishable tools and holders were designed and manufactured by Peerless, and tooling features a single-place fixture with manual clamping.

Monarch Precision SHAPLANE Radius Tools

Illustration shows convex cutter for ¼" to 2½" balls.

FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS

Range ½" to 3" for concave Radii. Also heavy duty models for radii to 6" on planers, etc.

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Builds the BEST Quality at the BEST Price

¼ H.P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.
High speed medium-light operation.
For bench, floor and pedestal mills.
Fits milling machines with overarm 1½" to 3".
⅜" end mill capacity.

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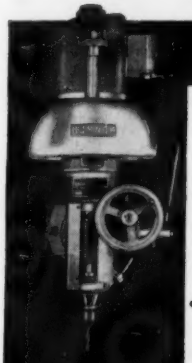

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HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.

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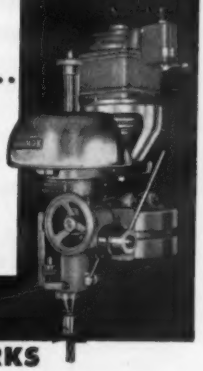
HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.



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DEALERS IN ALL PRINCIPAL CITIES

MILLING • DRILLING • BORING

This special-purpose machine is designed to automatically drill, ream and deburr production workpieces in a 12-station operation.

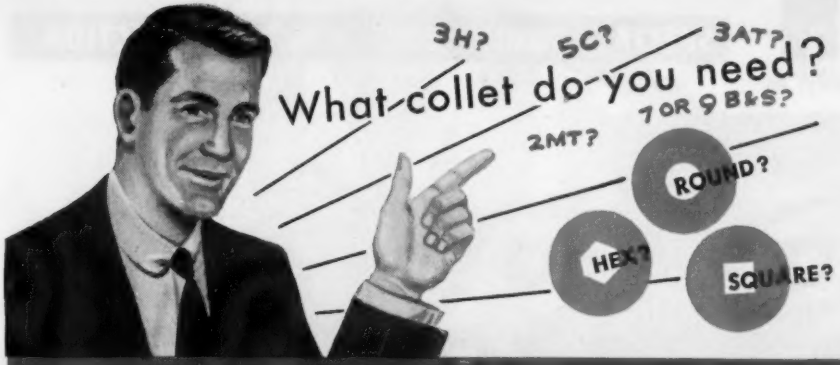
Special-Purpose Drilling, Reaming and Deburring Machine

A SPECIAL-purpose machine, capable of automatically drilling, reaming and deburring production workpieces in a 12-station operation, has been developed by Turner Bros., Inc., 2625 Hilton Rd., Ferndale, Mich. Three of these machines were specially built for a large automotive parts manufacturer and, at the present time, each machine is turning out 1400 valve plungers per hour at 100 per cent efficiency.

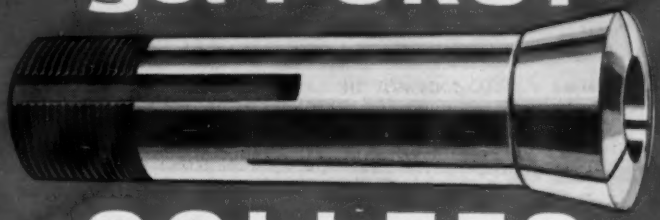
Loaded at Station 1, the workpiece is automatically clamped in a diaphragm chuck by means of air valves mounted in the center of the indexing table, and then indexed to Station 2 where one 3/32-in. diameter hole is drilled while the operator loads another part. Indexing to Station 3, the diaphragm chuck rotates 90 degrees and another 3/32-in. hole is drilled. The same operation takes place at Stations 4 and 5 while the indexing and loading cycle continues.

At Station 6, a 0.406-in. diameter hole is reamed by a vertically mounted reamer, removing the burr caused by drilling. At Stations 7, 8, 9 and 10, the drilling operation is repeated since the reaming causes some of the burrs to be pushed back into the 3/32-in. holes. This redrilling pushes the burr back into the 0.406-in. hole, and the burr is finally removed entirely at Station 11 by a duplicate vertical reaming operation. At Station 12, the part is automatically ejected by means of a cam attached to the indexing table of the machine.

All components of the machine are standard, including the base, columns, "Hautau-Turndex" indexing table, drill units and diaphragm chucks. Should production of one kind of part be stopped, the machine with its standard components can be used again for another job.



get PORST



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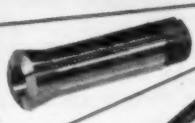
for your lathes and milling machines!



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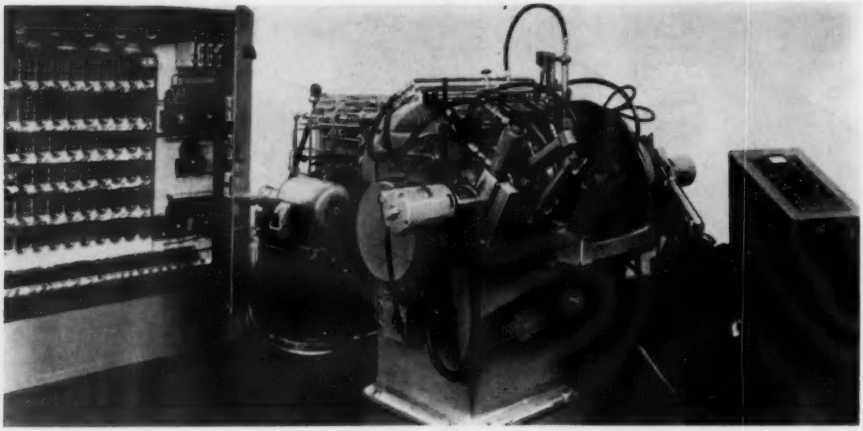

This illustration shows a general view of the machine complete with electrical control panel and master control push-button station. All operations of the machine are controlled from the master control station where spindle speeds can be read from a built-in tachometer.

Machines Are Specially Designed to Produce Aircraft Propeller Hub Cams

STANDARD Machine & Tool Co., Windsor, Ontario, recently completed manufacture of a number of specially designed and constructed two-spindle grinding machines, known as "Holewise," for the production of fixed and rotating cams for aircraft propeller hubs. These machines are designed expressly for grinding slots of a special form which are held to close tolerances both in contour and spacing. They are adaptable to other forms and spacings, however, through the use of suitable cams and fixtures.

Accurate requirements of the work necessitated extremely fine fits between all parts of the machines coupled with complete interchangeability for servicing. The machines are completely automatic in cycle, including rough and finish grinding, wheel dressing, fixture indexing and size control.

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SPUR • SPIRAL • WORM • BEVEL GEARS
GENERATED WITH PRECISION
ON MODERN EQUIPMENT
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...the *Preferred* Small Hole Gauge No. 36

Skilled and unskilled employees can use this superbly designed two-point contact gauge to make quick, accurate, *impersonal* inspections of small holes for size, taper and roundness.

The spherical contact point automatically centers itself and indicates the true diameter at the point measured.

The Ames Small Hole Gauge No. 36 checks holes with 3/16" to 1" diameter, up to 2" deep. Longer lengths and special contacts to check irregular recesses, splines, available.

Ames No. 15 Jaw Gauge

Ames No. 13 Dial Comparator

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Write for your free copy of Ames' General Catalog.

Representatives in principal cities.

B. C. AMES CO.

29 Ames Street Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

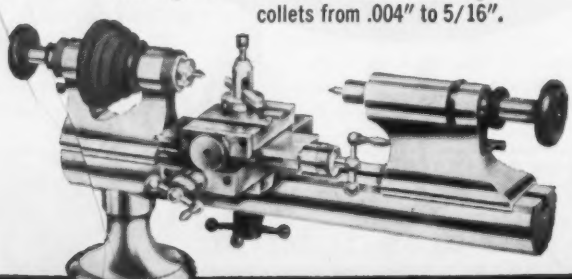
In order to allow for grinding of both sides of the slots in the parts independently and to provide for wheel wear and adjustment, a "side shaft" arrangement is built into the heads. This is controlled by a wedge mechanism actuated by hydraulic cylinders.

An unusual feature of the machines is the electronically controlled variable speed arrangement to the grinding wheel spindles which ensures constant periphery speeds throughout the life of the grinding wheels. A switching device actuated by the "side shaft" of the wheel spindles controls this setup; wheels can be considerably reduced in diameter before they need replacing. Oscillation is provided to the spindles in order to distribute the wear on the wheels, thereby ensuring greater life, and to provide a high degree of finish to the parts. Oscillation may be cut "in" or "out" as desired from the master control station.

Coolant which is fed directly to the wheels during the grinding operation is filtered through a magnetic type separator in order to separate cuttings and ensure the best of grinding conditions. A floor mounted hydraulic panel is used to actuate the various cylinders controlling the motions of the machine.

SMALL INSTRUMENT PARTS ARE MADE BEST ON LEVIN® LATHES

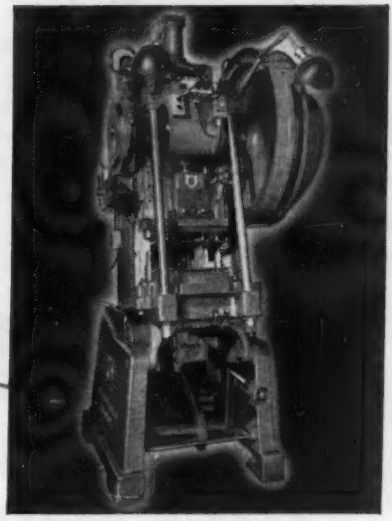
Twenty-three models for all types of work. 4" swing, Bed Length 12" or 18"; over 100 stock sizes of collets from .004" to 5/16".



Send for Catalog L describing Lathes for tool work, second operations; turrets and full line of accessories.

LOUIS LEVIN & SON, INC., 3610 SOUTH BROADWAY, LOS ANGELES 7, CALIF.

WHAT R-B PUNCHES SAVE...



What does this press cost you per hour?

If you use shoulder or set-screw type punches, you have excessive press down-time when replacing worn or broken punches.

But, with R-B interchangeable and standardized punches and die buttons you get quick insertion and removal in the press. The R-B ball lock features, that assure positive radial alignment and vertical locking without further keying, permit greater press utilization.

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SHEET METAL DIES MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

Massive Double Ram Vertical Broaching Machine Features Electro-Mechanical Drive

CLAIMED to be the first of its kind in the world, a double ram vertical broaching machine with electro-mechanical drive has been developed by The Lapointe Machine Tool Co., Hudson, Mass. Although primarily designed for the high production broaching of large aircraft engine turbine buckets, this double-ram machine with its unusually smooth operation is said to be readily adaptable to the mass production of many other parts requiring surface broaching.

Variable speeds are easily obtainable through a simple turn of a knob on the side of the machine. The electro-mechanical drive is designed around a constant torque variable speed d. c. motor, through a double gearbox and using a positive lock between the two rams. The main drive gear is a continuous tooth herringbone type gear and rack. The second reduction is through helical gears, and the third reduction is through a spiral bevel gear coupled through a d.c. motor.

The accompanying illustration shows the machine in the process of assem-

Precision Model

Standard Model

makes the Solid Arbor obsolete

CHAMPION
E-X-P-A-N-D-I-N-G
MANDRELS

The expanding sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand — no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from ½" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

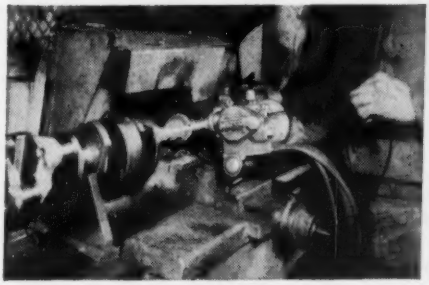
Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals — from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from ½" to 9½" diam.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.*

WESTERN TOOL & MFG. CO., INC.

Our 53rd Year • Dept. 28 • Springfield, Ohio

when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.

Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.

METALLIZING ENGINEERING CO., INC.

38-14 30th St. Long Island City 1, N. Y.

In Great Britain: Metallizing Equipment Company, Ltd. Chobham near Woking, England

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. **You haven't just salvaged a part—you've improved it.**

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

Don B. Watson, Metallizing Eng., Co., Inc.
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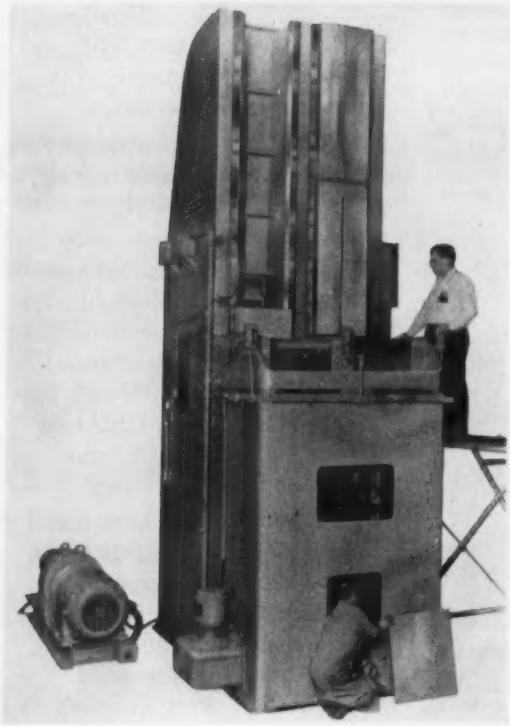
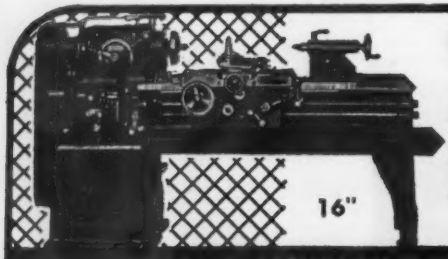
SPECIAL TOOLS FOR MORE PRODUCTION



Although primarily designed for the high production broaching of large aircraft engine turbine buckets, the massive double ram vertical broaching machine shown being assembled herewith is also said to be readily adaptable to the mass production of many other parts requiring surface broaching.

bly. Its weight is in excess of 30 tons, without tools. The slides, likewise, are unusually heavy and are 20 in. wide and set on 30-in. centers. Ways are lined with natural phenolic. Strokes of from 70 to 100 in. are available for this machine, with the horsepower of the motor suited to the requirements of the job.

The Lapointe exclusive tip-down type work table is a special feature of the machine. It is easy to load and unload, and minimizes operator fatigue. The machine is equipped with hydraulic units for the fixture, table and clamps; it has an automatic lubricating system, with machine shutoff if the oil level gets too low. An efficient coolant pump and motor unit is mounted at the side of the machine, as shown in the illustration. The machine is designed throughout for simplicity of maintenance.



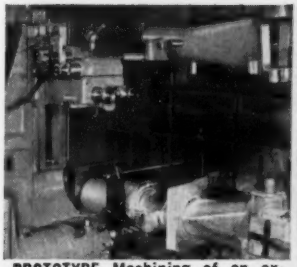
CARROLL AND JAMIESON LATHES

● This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin 39-A-10.

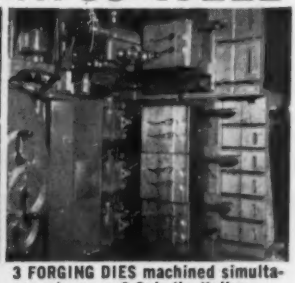
THE CARROLL & JAMIESON MACHINE TOOL CO. BATAVIA, OHIO, U.S.A.

SO MANY JOBS done....
so EASILY... so WELL



PROTOTYPE Machining of an experimental aircraft part from a solid billet

PLASTIC MOLD, intricate 3-dimensional milling from a plaster model



3 FORGING DIES machined simultaneously on a 3-Spindle Keller

ON A P&W TYPE BL KELLER AUTOMATIC TRACER-CONTROLLED MILLING MACHINE

because

- "KELLERING" REPRODUCES COMPLEX, IRREGULAR SHAPES FASTER, MORE ECONOMICALLY.
- KELLER MACHINES ARE DESIGNED AND BUILT SPECIFICALLY FOR TRACER-CONTROLLED MILLING.
- THEY'RE RUGGED, DEPENDABLE, STAY ON-THE-JOB.
- ELECTRIC TRACER CONTROL IS MORE DEPENDABLE, RELATIVELY SIMPLE, RETAINS ITS HIGH INITIAL ACCURACY INDEFINITELY.
- HORIZONTAL CONSTRUCTION PROVIDES MAXIMUM STRENGTH, RIGIDITY, EFFICIENCY and CONVENIENCE.

Just right for many average jobs in your shop the handy, versatile Type BL is available in two sizes, 24" x 16" and 36" x 20" — both with 8" transverse travel. Also can be furnished as 3-Spindle Machines with 8" or 10" center distances between spindles. Send now for complete information.

MODERNIZE with PRATT & WHITNEY REPLACE FOR PROFIT

PRATT & WHITNEY

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Please send my free copy of the KELLER TYPE BL Circular No. 490-3.

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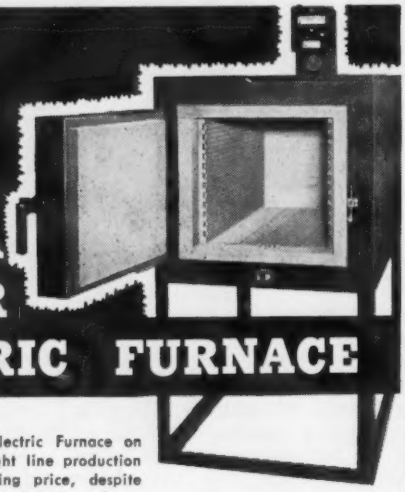
Special Gage Checks Ball Seats on Airplane Engine Mounting Struts

THE accompanying illustration shows a special ball seat gage made by Brown & Sharpe Mfg. Co., Providence 1, R. I., to check the dimensions of the ball seats on the forward mounting struts on airplane engines which must be held to very accurate tolerances in manufacture. The gage provides a very accurate check of the inside diameter of the ball seats in ten-thousandths inch.

In use, the gaging dimension is transferred to the dial indicator by an auxiliary plunger which rides on a cone at the back end of the gaging point. The gaging point is held against the working surface by means of a spring and the auxiliary plunger

This gage is specially designed to check ball seats on airplane engine mounting struts.

SAVE 3 WAYS WITH A LUCIFER ELECTRIC FURNACE



1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed—Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed, long lived, trouble free. More than two thousand satisfied users.

CHECK THESE PRICES

Furnace Size	2000°	2300°
6x 6x12"	$467.00	$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
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Complete with 100% automatic electronic controls.

WRITE FOR FREE LITERATURE, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation. Write, wire or 'phone today.

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Successors to Gilbert S. Simonski Company

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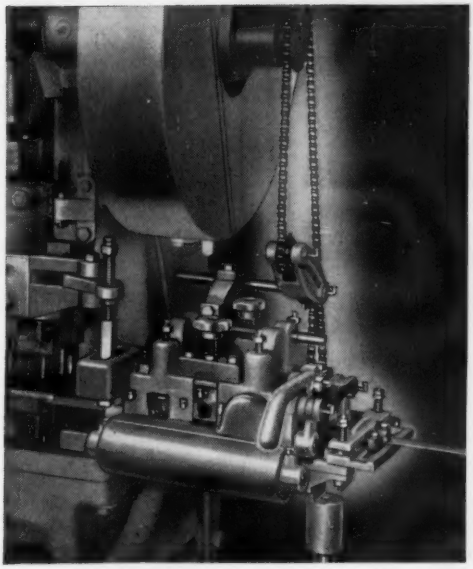
GET **RAPID-FIRE PRODUCTION**

from your PUNCH PRESSES

IT'S EASY WITH **WITTEK**

Automatic Roll Feeds



Step up production by making your punch presses automatic! Wittek automatic roll feeds fit all makes and sizes of punch presses — provide maximum efficiency and extreme accuracy in the high-speed automatic feeding of strip stock. They are made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any of four directions. Length of feed is quickly and easily adjusted to meet individual job requirements.

4404

WITTEK Reel Stands

Simplify Handling of Coiled Stock

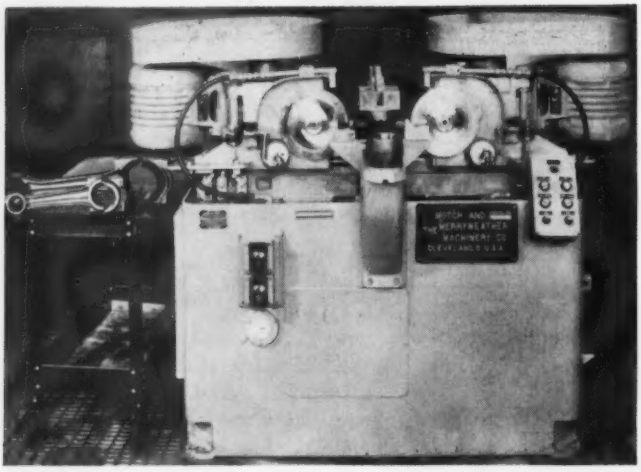
A choice of standard models is available to facilitate handling a large variety of coiled stock . . . from small, light coils to those weighing up to 800 pounds. These larger reel stands automatically center the coils and provide frictional braking action to prevent overrunning and maintain uniform coil slack.

Write for full particulars

WITTEK Manufacturing Co.

4322 W. 24th Place, Chicago 23, Illinois

Automatic ROLL FEEDS AND REEL STANDS



This illustration shows a machine specially developed to saw-cut caps from connecting rods.

also is held by a spring firmly against the gaging point. Provision is made for ready replacement of parts should wear occur, and the dial guard protects the dial gage against abuse or damage from manhandling.

Machine Is Specially Designed for Sawing Connecting Rods

CONNECTING rods forgings for automotive truck and diesel use are most commonly made as one-piece forgings. After partially machining them in this state, the cap is split from the shank of the connecting rod and then reassembled by bolts for final machining operations. The Motch & Merryweather Machinery Co., Cleveland 17, Ohio, has designed and produced a machine which accurately saw-cuts the cap from the connecting rod. The machine consists of right-hand and left-hand sawing heads mounted on hardened and ground steel ways on a base of suitable proportions. The saw heads carrying high speed steel triple-chip circular saw blades are fed by means of hydraulic cylinders simultaneously from each side of the forging to part the cap from the shank.

The part is loaded in the fixture by placing the machined pin end of the connecting rod over a hardened and ground locating pin with hardened steel blocks, providing location at the crank end where the saw cut is to be performed. Clamping is accomplished by a hydraulic cylinder over the top of the forging at the crank end.

The right and left-hand geared saw heads are each driven by 2 h.p. motors. The external hydraulic sump is furnished with a hydraulic pump, a 2 h.p. motor, valves and piping in accordance with J.I.C. Standards.

In the cycle of operation, the operator places a connecting rod in the fixture and presses a button to start the automatic cycle which consists of clamping the stock, feeding the opposing saw heads to the reset distance and returning, and then opening the fixture clamp. The operator repeats the cycle by removing the completed connecting rod and putting another one in its place.

"BEST BUY . . .
the boss ever made!"

LEACH 6 X 12 SURFACE GRINDER

HIGH OUTPUT
at LOW COST

Don't let the low price fool you! The Leach 6 x 12 Surface Grinder is an entirely new engineering triumph that does the BIG jobs. Easily and accurately handles 90% of the work of far more expensive machines. A proven giant money-saver by hundreds of enthusiastic owners. Completely self-contained . . . 2-speed ball bearing spindle, driven by a ¾ HP motor. Nowhere else can you get such high output at such low cost! Write for detailed description.

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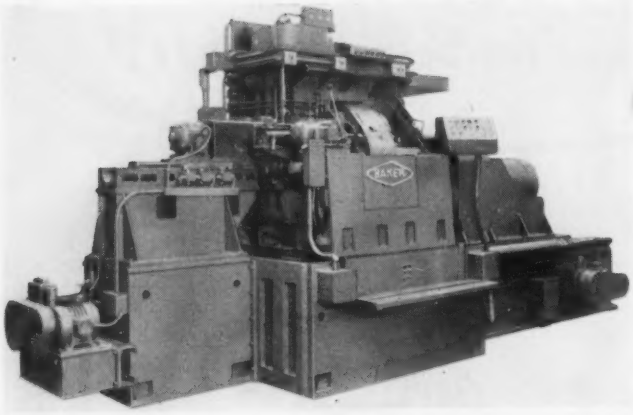
WORLD DISTRIBUTORS DEALERS IN PRINCIPAL CITIES



This four-station machine is specially equipped to perform multiple drilling operations on pistons for diesel engines.

Machine Performs Multiple Drilling Operations on Diesel Pistons

THE four-station hydraulic feed machine illustrated herewith, product of Baker Brothers, Inc., Toledo, Ohio, is designed to perform multiple drilling operations on floating pistons for diesel engines and is said to produce 41 parts per hour at 100 per cent efficiency. Mounted to a heavily constructed well-ribbed steel end bed is a floor type unit having 30-in. width of hardened steel ways in 60-in. length of saddle with automatic lubrication for saddle, ways and gibs.

The machine has an available feeding pressure of 23,500 lb. and is equipped with an Oilgear variable delivery pump, base mounted with ample oil sump. The multiple head unit is arranged for direct drive from the main motor with provision for pick-off speed change gears. Spindles are of the quill type.

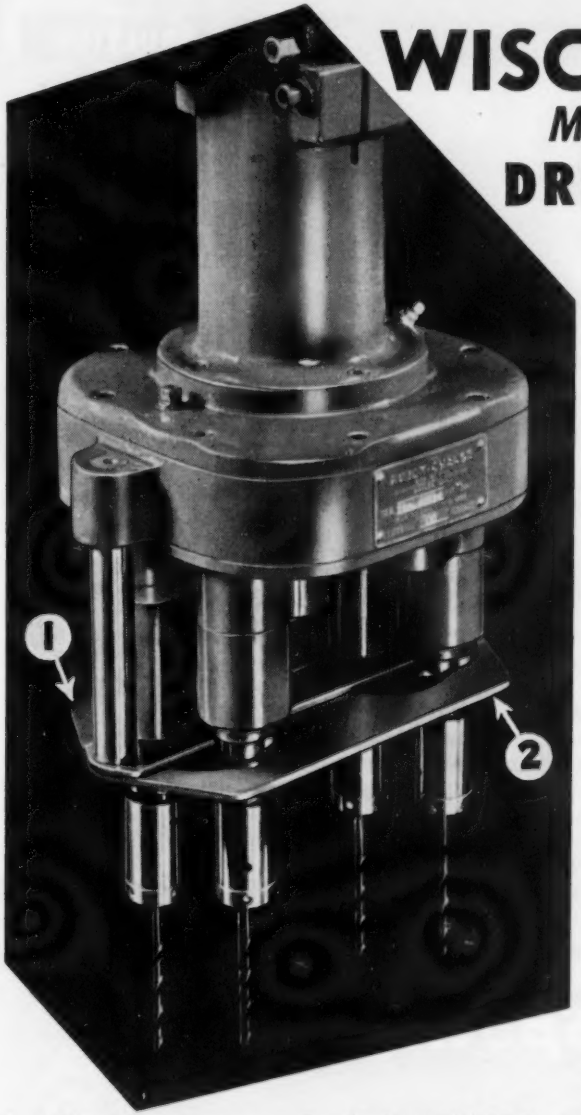
Mounted at the opposed end of the machine at Station No. 4 is an auxiliary single spindle hydraulic feed unit with an independent hydraulic system for the finish centering operation of the dome end. A centrifugal type pump with ample coolant sump is provided. The main unit is equipped with two feeds, and both units are provided with positive stop delayed reverse and electrical cycle to the controls. Hand indexing is achieved with a single control panel.

The operating cycle is as follows: Station No. 1—load and unload one part; Station No. 2—single point bore outer bore (semi-finish); Station No. 3—semi-finish inner bore, semi-finish counterbore and bottom face, finish face and chamfer outside face of bottom counterbore; and Station No. 4—finish taper bore, generating single point tool, recenter dome.

Tapping Machine Is Specially Tooled for Production Threading of Pipe Plugs

KAUFMAN Mfg. Co., Manitowoc, Wis., recently shipped a hydraulically operated, electrically controlled tapping machine with a four-division hydraulically operated automatic indexing dial for use in the production threading of ½-in. 14-pitch thread taper pipe or cast iron pipe plugs at 300 r.p.m. and 60 s.f.p.m. This setup results in a gross production of 2,200 pieces per hour, threading 3 parts at a time.

WISCONSIN
Multiple
DRILL HEADS



Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

2. Locking Plate has full holes to hold spindles in place.

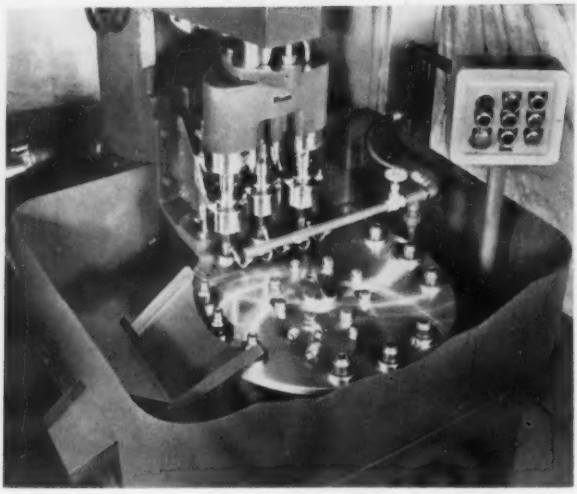
Send print of Hole Pattern for estimate.

WISCONSIN DRILL HEAD CO.

BUTLER, WISCONSIN

A 5942-1P

SPECIAL TOOLS FOR MORE PRODUCTION



This close-up view of the Kaufman Model 75-24 Tapping Machine shows the tooling that provides for the production threading of ½-in. 14-pitch thread taper pipe or cast iron pipe plugs at the rate of 2,200 pieces per hour.

Referring to the accompanying close-up view of the Kaufman Model 75-24 Hydraulic Tapping Machine, the three parts shown at the left on the automatic indexing dial are in a position just prior to automatic ejection, which causes the threaded parts to fall into a chute and eliminates touching of the parts by the operator. In addition to the four-division dial equipped with 12 self-holding part fixtures and the triple automatic parts unloader, tooling of the machine includes a three-spindle multiple head in which the spindles are individually adjustable vertically. If desired, the multiple head can be quickly removed for single-spindle application. The machine can also be adapted to various similar threading jobs to that shown or to the tapping of three or four parts at a time within the capacity of the machine.

Single Spindle Automatic Chucker Challenges High-Cost Production

ON a variety of parts that have been processed on the new 12-in. Universal Single Spindle Chucking Ma-

Specify DESTACO FEELER STOCK
For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015" to .015".
DESTACO DETROIT STAMPING COMPANY
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You can do better...with
B·RIGHT·ON®
SOCKET SCREW PRODUCTS
You can't keep production up when socket screw problems are getting you down. Even such a small thing . . . one screw that doesn't start quickly or drive home correctly . . . perhaps a shipment that doesn't arrive on time . . . can hamper a fast-moving production line.
For screws that fit your needs in every way . . . quality, sizes, specifications and service . . . you can do better with B-Right-On Socket Screw Products. Best materials, most modern production methods, careful inspection and a tradition of service to users through selected mill supply houses assure your complete satisfaction.
We'll submit descriptive literature or samples for your most critical examination. No obligation, of course; just specify types and sizes.
THE BRIGHTON SCREW & MANUFACTURING CO.
Reading Rd. at Dorchester
Cincinnati 2, Ohio
QUALITY
B-RIGHT-ON
PRODUCTS

Operator directs coolant nozzle on cutting tools following loading of 7¾-in. steel casting hydraulic cylinder body in 12-in. Universal Model MC Acme - Gridley Single Spindle Automatic Chucker. All ten machining operations of the first operation setup (on one end) of the cylinder body will be performed without operator intervention during the automatically controlled machining cycle before the machine stops for unloading of the workpiece.

chine which is being manufactured by The National Acme Co., 170 E. 131st St., Cleveland 8, Ohio, as much as five times faster floor-to-floor time than with formerly used methods is being achieved.

Higher speed operation is made possible through completely automatic control of the entire machining cycle which provides predetermined cycle time for all machining operations in the setup. No time is lost from the start of the machining sequence after loading until the finished piece is unloaded, with the result that less operator fatigue is experienced, the same machine cycle rate applies at the end of a shift as at the start, and faster and more accurately scheduled production is obtained. Moreover, with its open tooling zone and easily accessible chucking area, there is sufficient room for automatic loading equipment for the purpose of adapting this particular machine to an "automation line."

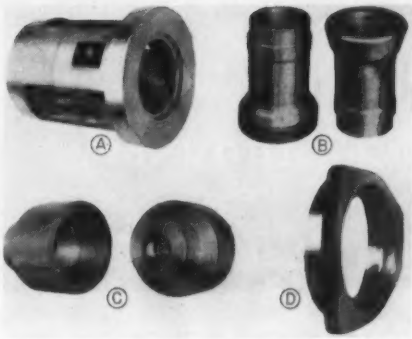
Wider speed and feed ranges with speed changes automatically controlled during the machine cycle give this chucker greater versatility in combining carbide and high speed tooling, as well as threading in the same automatic setup. Each of the five turret toolslides and two cross slides is independently cammed. "Idle time" movements, such as advancing toolslides to cutting position, returning them after completion of cut to turret indexing position, and indexing of the turret slides, are all accelerated. With these features, more machining operations are incorporated into an automatically controlled cycle and the total machining time per piece for all operations in the setup is predetermined exactly in accordance with tolerances and finish required.

The 12-in. Universal Model MC is easy to tool up. The tooling zone is without interference from shafts or accessories—the operator has free access

SPECIAL TOOLS FOR MORE PRODUCTION

to tools at elbow height. Cams for the toolslides are readily accessible, and the timing control switches are grouped for operation from cam dogs mounted on a single drum at the rear of the machine. This design for quick changeover from job to job makes the air-operated chucker economical and practicable for small lot setups, as well as long production runs.

Adaptability for additional tooling, including specialized attachments for self-opening threading dies and collapsible taps, permits more operations to be included in a single automatic setup, thus avoiding rehandling the piece. Built for heavy duty performance, the machine incorporates a husky basic frame structure, heavy toolslides without overhang, fast and shockless turret indexing, and modern safety devices which protect both the machine and the operator.



Typical parts produced on 12-in. Universal Model MC Acme-Gridley Single Spindle Automatic Chucker: (A) finger holder body; (B) semi-finished master collet blank; (C) hydraulic cylinder body; and (D) Lumen alloy retainer ring.

HOW IMPORTANT IS

CHATTERLESS COUNTERSINKING *To You?*

The Severance Chatterless Countersink is Engineered For Today's Fast Production Schedules. It Will Give You What You've Always Wanted In A Countersink. CHATTERLESS ACTION — —SMOOTH SEATS — FAST CUTTING — LONG SERVICE.
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TOOL Nº	DIAMETER	SHANK DIA	*PRICE
CB	1/4	3/16	1.30
EC	3/8	1/4	1.85
GD	1/2	3/8	2.40
JF	3/4	1/2	4.60
LI	1	1/2	7.00
PK	1 1/2	3/4	13.65
SM	2	1	20.50

*PLUS 10% IN LESS THAN 10 OF ANY ITEM

SAVE YOUR TIME!
Order directly from this Ad, give: Tool No. and Centerline angle desired. Thus: 12 only CB-30° 24 only GD-41°; etc.

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news of the industry

Hartford Special Machinery Company Opens New Plant

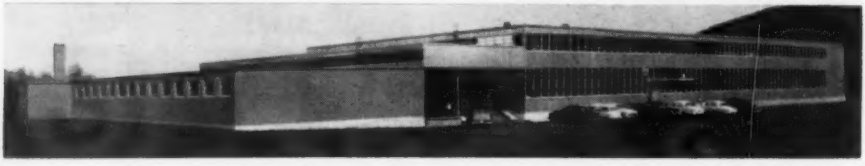
The Hartford Special Machinery Co., Hartford, Conn., has announced the opening of its new, ultra-modern, 44,000 sq. ft. plant in Simsbury, Connecticut. According to Robert P. Merritt, president, this is the first step in a plan which will ultimately move the company's entire operation to Simsbury.

For the present, Hartford Special's new building will be used as an assembly plant. The fabrication of parts and the main offices will continue at the present Hartford location at 287 Homestead Avenue. Noted for its design and production of individual single-purpose automatic drilling and tapping machines, the company also produces a line of Super-Spacers and automatic thread rollers, in addition to offering facilities for general contract machine work.

Eighteenth Annual Time and Motion Study and Management Clinic

The Eighteenth Annual Time and Motion Study and Management Clinic, sponsored by the Industrial Management Society, will be held on November 10, 11 and 12, 1954, at the Sherman Hotel, Chicago, Ill. More than 2,000 industrial engineers, works managers, plant superintendents and supervisors are expected to attend the technical sessions and industrial exhibits. Top-flight industrial leaders from all over the United States will discuss the latest developments in the fields of time study, motion economy, job evaluation, methods, plant layout, materials handling and human relations.

A feature of the event will be the Annual Methods Improvement Contest, with awards to companies and colleges for outstanding advances in industrial engineering techniques and applica-



New plant of The Hartford Special Machinery Company in Simsbury, Connecticut

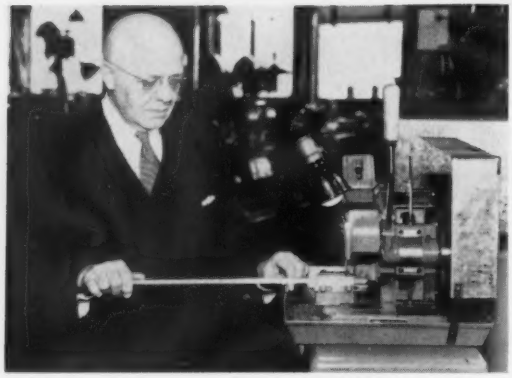
tions. Further information concerning the clinic may be obtained by writing direct to the Industrial Management Society, 35 E. Wacker Drive, Chicago 1, Illinois.

L. H. Hamilton Industrial Distribution Awards Made

The eighth annual L. H. Hamilton Awards for "Outstanding Contributions to the Industrial Distribution Industry" were presented recently by Bob Hamilton, president of The Dumore Co., Racine, Wis. Three leaders in both manufacturing and distribution were honored on the eve of the annual Triple Mill Supply Convention. The award, an inscribed watch, was presented in the Waldorf Astoria suite of Industrial Distribution Magazine by Mr. Hamilton to the outgoing presidents: J. Robert Kelley, president, American Supply and Machinery, Manufacturer's Association; Ben S. Barker, president, Southern Industrial Distributor's Association; and T. Gordon Vaughan, president, National Distributor's Association. Mr. Kelley is vice president of Manning, Maxwell and Moore, Inc., Stamford, Conn., and Muskegon, Mich. Mr. Barker is vice president of Pye-Barker Supply Co., Atlanta, Ga., and Mr. Vaughan is vice president of the W. M. Patteson Supply Co., Cleveland, Ohio.

The awards, originated by Bob Hamilton in 1947, are in honor of his father, L. H. Hamilton, present chairman of the board of directors and founder of The Dumore Company.

It's the wHOLE Truth.....
Double eccentric type for irregular spacing
Universal joint with slip spindle fixed locating plate
Single eccentric type for equally spaced holes on bolt circles
US HEADS
Machine tool men "in the know" have long acclaimed the "US" Adjustable Multiple Spindle Drill Heads with their quick-change universal joint assemblies. They are built for continuous use, with full anti-friction bearing construction for high capacity thrust loads. The universal joint adjustable multiple spindle type is suitable for any sensitive drilling machine. Joints are self-lubricating.
The single eccentric type is used for equally spaced holes on bolt circles.
The new double eccentric AdjUStafix, two to eight spindles, permits spindles to be located in non-symmetrical patterns. It eliminates expensive change in set-up.
Write for details on any type of universal joint adjustable head. Ask also about our totally enclosed gear-driven adjustable, fixed center, or individual lead screw tapping heads.
UNITED STATES DRILL HEAD CO., 616-618 Burns St., Cincinnati 4, Ohio



Walter A. Sittig critically inspects and tests a newly completed Rouse Hand Miller before shipment is made to the customer.

Founder-Secretary Marks 55 Years with H. B. Rouse Company

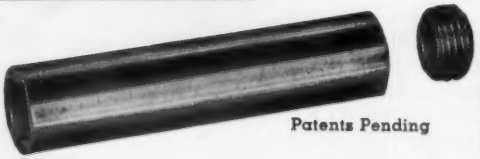
Back in 1899, a young chap named Walter A. Sittig borrowed $1,500.00 from his aunt to help found H. B. Rouse & Company in Chicago. Mr. Sittig began as secretary. Today, 55 years later, he is still secretary. Through the years, Mr. Sittig has been active in all phases of the business. As part of management, he has helped guide his company through three major depressions, three booms and two world wars. In addition, he has had a hand in engineering and developing the various Rouse products. Although these are primarily used in the graphic arts field, the firm has also achieved importance in the machine tool field.

Although Mr. Sittig is in a class by himself, faithfulness is not unusual at H. B. Rouse & Company. One-third of the employees have spent over 35 years with Rouse. Two-thirds of the employees have worked there over a quarter

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending

SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE

23516 TELEGRAPH ROAD DETROIT 19, MICH.

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POWER PRESSES

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will do the job so much quicker and better?

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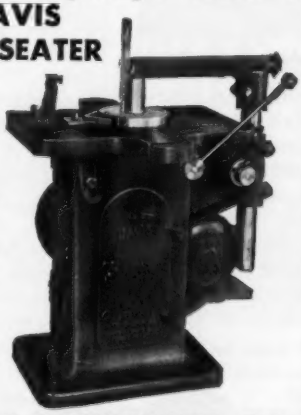

DAVIS KEYSEATER CO.

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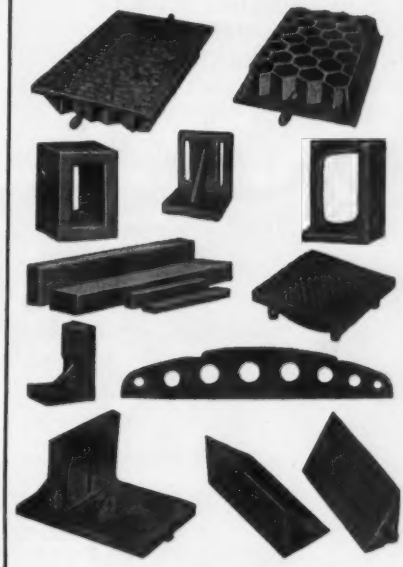

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of a century. Rouse's dealers have a similar record of loyalty. Fifteen per cent have been selling Rouse products for over 35 years. Eighty-one per cent have done business with Rouse for over 20 years.

Gisholt Launches Machine Tool Rental Plan

Gisholt Machine Co., Madison, Wis., has announced a plan for the leasing of machine tools. Three plans are available, each based on a seven-year lease agreement.

Each plan may be written either with or without the option to purchase. The right to terminate the agreement at the end of one, two or three years depends on the plan selected. The lease may also be written with the option to purchase at the end of any one of these same years. The lease plan is designed to cover standard machines, plus the required electrical equipment. Certain accessories and all tooling must be purchased outright. Special purpose machines can be leased by special arrangements. All plans are restricted to firms with well established credit references and limited to firms operating within the continental limits of the United States.

The Gisholt Machine Company manufactures an extensive line of machine tools, including turret lathes, automatic lathes, automatic turret lathes, static and dynamic balancers and Superfinishers, as well as attachments. Any of these various machine tools and equipment may be leased under the new plan.

ACCO products
Campbell Abrasive Cutters
Model 406 Abrasive Cutter
Capacity: Up to 6" dia. solids
Model 223 Abrasive Cutter
Capacity: Up to 2" dia. solids, 4" dia. tubing

Quick cut-offs save you money—here's how . . .

1. Superior Sales Engineering Service. CAMPBELL engineers, experienced in every type of cutting problem, are available for consultation on YOUR cutting problems.

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AMERICAN CHAIN & CABLE

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The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½—$1.36; ⅝—$1.36; ¾—$1.58; ⅞—$1.89. Write for price list.

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For SAFETY in marking all kinds of Metal

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Whitnon Surface Grinder Spindles are precision made for faster stock removal and finer finishes . . . Ideal for the most unusual grinding applications. Whitnon spindles are dynamically balanced as a complete assembly—skillfully lubricated to guarantee long life under most adverse conditions. Heavy spring preloading prevents all endwise motion or deflection of the rugged alloy shaft.

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Gilbert Altschul Forms Film Producing Company

Gilbert Altschul, a six time international and national motion picture award winner, has announced the formation of Gilbert Altschul Productions, a film producing company. Formerly senior motion picture producer-director of Coronet Films, Mr. Altschul is now producing films for public relations programs of business and industry. According to Mr. Altschul, the leaders of American industry, research and commerce have at their disposal one of the most powerful devices of communication in the motion picture. To be really effective, however, films must be expertly designed, integrated with existing sales and public relations programs and wisely used. To help perform this service, the new organization has available experienced and fully-qualified film technicians and craftsmen. The headquarters of Gilbert Altschul Productions is 1760 Clavey Rd., Highland Park, Illinois.

21st National Power Show Moves to Philadelphia

Announcement has been made that the 21st National Exposition of Power and Mechanical Engineering is scheduled to be held at the Commercial Museum in Philadelphia, December 2 to 7. The transfer of the show to Philadelphia was determined by a vote of exhibitors when Grand Central Palace in New York, where it has been held heretofore, was rented by the government. As in recent years, the exposition will be held under the auspices of the American Society of Mechanical Engineers, whose annual meeting is scheduled in New York, November 28 to December 3. For this reason, the exposi-

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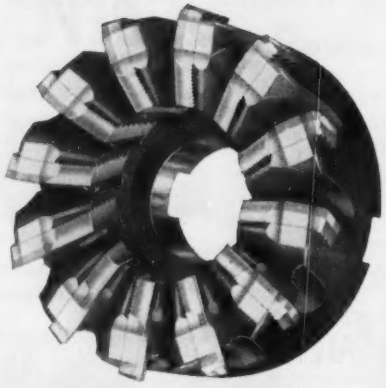
HEAVY DUTY JOBS

APEX offers many cutters for many jobs. Here's one that takes a big chip fast. It can be had with H.S.S., Stellite, Cobalt or Carbide tipped blades. These blades adjust automatically in two directions. No damage to carbide tips. Diameters from 8" to 24". We also make cutters for *lighter* work. Write for catalog.



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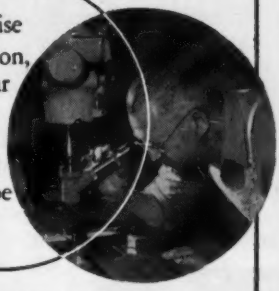
Precise hole location, easy contour inspection with *new* machine tool microscope



- Wide field of view (¼"); 30x magnification
- Gages accurately to .0001—at a glance
- Mounts on offset bracket, or directly in the spindle
- Fits nearly any machine tool
- Image always appears erect and true
- Ideal for checking slots, contours, surface conditions, or transferring hole locations from template to workpiece.

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Norwalk, Connecticut

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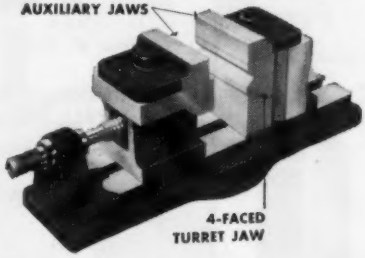

Brown Turret-Jaw Utility Vises cut production costs by eliminating time wasted on "rigging" set ups. It improves work quality because of rugged construction and ability to hold work tightly.

For complete specifications and prices write for Bulletin 23M, Brown Engineering Co., 120 N. 3rd Street, Reading, Pa.

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AIR GRINDERS

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

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MADISON-KIPP CORP.
208 Waubesa St., Madison 10, Wis., U.S.A.

tion was jointly planned to open on Thursday, during the week of the meeting, and continue through Tuesday of the week following, except for Sunday when it will be closed.

Arrangements for the show are under the management of the International Exposition Company of New York, with Charles F. Roth as manager and E. K. Stevens, associate manager.

Paul W. Polk Elected President of Threadwell Tap & Die Company

At a recent meeting of the company directors, Paul W. Polk was elected president of the Threadwell Tap & Die Co., Greenfield, Mass. According to company officials, this action was taken in recognition of the progress being made by the company. Other officers are Louis F. Polk, chairman and treasurer; John P. Bernard, vice president; R. F. Whisler, vice president and assistant treasurer; Edward T. Noe, Jr., secretary; Esther Hertter, clerk; and Glenn E. Price, assistant secretary. In addition to his duties as head of Threadwell, Mr. Polk is active in civic affairs and recently headed the successful Greenfield Community Chest campaign. The Threadwell Tap & Die Company is a subsidiary of The Sheffield Corp., Dayton, Ohio.

Paul W. Polk

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Close tolerance parts for aircraft, radar, electronics, precision instruments, etc. Screw machine, milling, boring, grinding, honing, and lapping operations, with accuracies to .00005. Fine finishes to No. 3 Micro. Heat resistant and stainless steel, Nitralloy, bronze, etc.

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- SQUARE BLADES Easily Replaced.
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- Cutters from 1½" to 14" dia.

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MACHINE KEYS
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For Tools and Small Parts

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THE COOLEY FLOOR MODEL
for HARDENING AND TEMPERING

Max. Temp.	Sizes	Price
2000°	12" x 8" x 18" 12" x 8" x 24" 12" x 8" x 36" 15" x 12" x 30"	$1030 to $1485

All prices are less controls. Any standard controls available for automatic temperature control.

- Cooley modern design provides natural convection—increases uniformity. Heavily insulated large area door makes for low heat loss—reduced power needs.
- Natural thermal convection.
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Controlling Pyrometers carried in stock—available for all applications.

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TAPER REAMERS for all types of die work

- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pin, chucking, die makers and special reamers.

Top National Safety Council Award Presented to Firth Sterling Inc.

The Award of Honor, highest safety award of the National Safety Council, has been conferred upon Firth Sterling Inc., Pittsburgh, Pa., for the year 1953. H. H. Brainerd, executive manager of the Western Pennsylvania Safety Council, local chapter of the National Safety Council, presented the plaque to K. D. Mann, president of Firth Sterling. Also at the presentation were J. T. O'Brien, vice president of operations, and F. J. McKay, director of industrial relations.

Outstanding in the Firth Sterling 1953 safety record was the occurrence of only 10 loss-time accidents which were of a minor nature, with loss time negligible. During a period of nine months, the company completed 1,778,915 man hours with no loss-time accidents. Firth Sterling maintained a par rate for frequency of 3.0 compared with the industrial standard of 9.7, while the par rate for severity dropped to .05 compared to the industrial average of 1.20.

Midwest Style Cutters Now Being Manufactured by Quality Tool Works

Since Sheldrick Mfg. Co., Upper Sandusky, Ohio, (formerly Midwest Tool Co., Detroit, Mich.) has discontinued business, Quality Tool Works, Waukegan, Ill., is now manufacturing Woodruff keyseat cutters having tapered shanks that are made to fit the Midwest style holders and are commonly referred to as Midwest Type 525.

Quality Tool Works can furnish either the short taper shanks, comparable to Midwest Type 500, or the long taper shank, comparable to the Midwest Type 525. Holders for the 525 style are also available for most types of milling machines.

Portable Hand Lever Punch

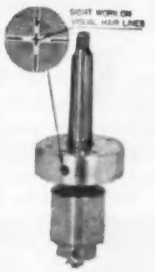
No. 4B PUNCH

Capacity—1/4" hole thru 1/16 gage iron.
Length—8½"; Depth of throat—2".
Weight—3 lbs.
Stock size punches—1/16" to 9/32" by 1/64".
Can be had complete in metal box as shown or in cardboard carton.

W. A. WHITNEY MFG. CO.
640 Race St. Rockford, Ill.

MSE

TOOLMAKER'S DRILL CHUCK



Will locate your layout to .0001"—200% saving in time. For vert. mills, radial drills and lathes. Combination of high precision chuck and totally enclosed optical unit. Adjustment for spindle run-out. Priced considerably less than you might expect to pay for this unique tool. No. 2 or No. 3 Morse taper . . . 0-½" capacity.

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Exclusive 3-Way Travel

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are performing countless close tolerance machining operations on big run jobs.

You can easily effect a 50% economy in the milling costs of small parts.

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Straddle milling using our standard stub arbor.

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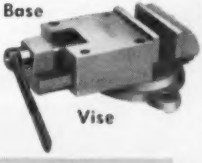
Graduated Swivel Base



Vise

Slotting with our standard stub arbor.

BARKER ENGINEERING COMPANY
502 GREEN ROAD
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William Pynchon Medal Awarded to F. D. Van Norman

Frederick Dewey Van Norman, chairman of the board of Van Norman Co., Springfield, Mass., and one of that company's founders nearly 70 years ago, was recently awarded the William Pynchon Medal, given annually to an outstanding resident of the community by the Advertising Club of Springfield. First awarded in 1915, the medal has been bestowed on such celebrities as the late Congressman Frederick H. Gillett; the late Charles E. Duryea, inventor of the automobile; former Massachusetts Governor Joseph B. Ely; John C. Garrand, inventor of the Garrand rifle; Chester Bowles, former ambassador to India; and Dr. Paul M. Limbert, former president of Springfield College and presently head of the world Y. M. C. A. organization. In addition, some 70 men and women of the Greater Springfield community have also been given the Pynchon Medal over the past 40 years.

Mr. Van Norman, who will observe his 92nd

Frederick D. Van Norman

birthday in December, was born in Hamilton, Ontario, Canada. He joined his father and brothers in a small machine shop in Waltham, Massachusetts in 1882 and came, with them, to Springfield in 1890 when their firm relocated in the western Massachusetts city.

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Sizes: 2", 4" and 6".

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Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

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Even the most delicate and highly finished parts or tools may be tested for hardness WITHOUT DAMAGING or DEFORMING THE FINEST FINISH.

The diamond impressions (invisible to the naked eye) are produced with loads of only 15 to 300 grams.

The pyramid (or optionally rhombic) shaped impressions are measured by means of a 400-power microscope with reticule graduated to .0005 mm.

Microscope objective 400x, indentator as well as an extra 100x locating objective are mounted on a common revolving turret for quick indexing on the impression.

The DURIMET opens up a NEW FIELD of Hardness Testing for every shop where other methods prove too costly or unsuitable.

A reasonable price - simple operation, make the DURIMET essential equipment for any shop.

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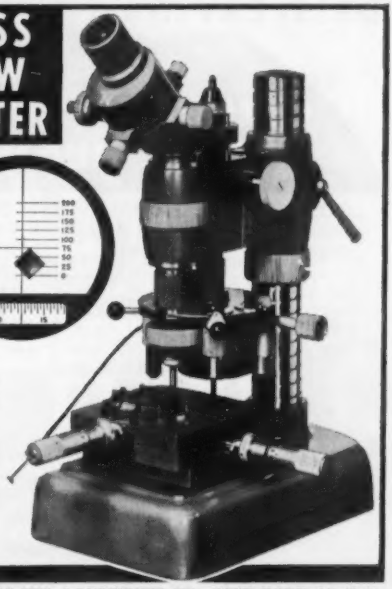

Geo. SCHERR OPTICAL TOOLS, Inc. 200-MM LAFAYETTE ST.•NEW YORK 12, N.Y.

Herbert Harig Named Secretary of N.T.D.M.A.

Herbert C. Murrer, president of the National Tool & Die Manufacturers Association, has announced the election of Herbert Harig, vice president of Harig Mfg. Corp., Chicago, Ill., as secretary of the N.T.D.M.A. Mr. Harig, who formerly served three consecutive terms as association treasurer, succeeds the late Albert Goldman of Philadelphia. The association represents 800 of the nation's leading contract tool, die and special machine shops.

Herbert Harig

Diamond Tool Research Announces Expansion Program

The paradox of increasing business and sliding prices is one of the reasons attributed to the recent expansion program launched by Diamond Tool Research Co., Inc., New York 10, N. Y. Another is a long-range research program designed to find new uses for industrial diamonds, a program that is beginning to pay dividends. The company's expansion program recently caused it to move to new quarters with a 400 per cent increase in space, as well as a corresponding increase in production and research facilities. The greater availability of industrial diamonds has sharply increased its use for grinding, shaping and polishing very hard materials, deep core drilling, especially for oil, and as an abrasive. Willard L. Huber, manager of Diamond Tool Research Company, predicts ever

IMMEDIATE DELIVERY from STOCK

STANDARD CIRCULAR FORM TOOL BLANKS

(Made of High Speed Steel) Soft or Hardened

Width	No. 00 B. & S. Soft	No. 00 B. & S. Hardened	No. 0 B. & S. Soft	No. 0 B. & S. Hardened	No. 2 B. & S. Soft	No. 2 B. & S. Hardened
1/4"	$1.00	$1.50				
5/16"	1.[illegible]	1.60	$1.75	$2.20		
3/8"	.20	1.70	1.90	2.40	$2.80	$3.50
7/16"	1.30	1.80	2.05	2.60	3.00	3.85
1/2"	1.40	2.00	2.20	2.80	3.20	4.20
9/16"	1.50	2.20	2.35	3.05	3.45	4.50
5/8"	1.65	2.40	2.50	3.30	3.70	4.90
11/16"	1.80	2.60	2.65	3.55	4.00	5.40
3/4"	2.00	2.80	2.80	3.80	4.30	5.80
13/16"	2.20	3.00	2.95	4.00	4.60	6.20
7/8"	2.40	3.20	3.15	4.20	4.90	6.60
15/16"	2.60	3.60	3.30	4.40	5.20	7.00
1"	2.80	3.80	3.45	4.70	5.50	7.40
1- 1/16"			3.60	5.10	5.85	8.00
1- 1/8"			3.75	5.50	6.20	8.60
1- 3/16"					6.60	9.20
1- 1/4"					7.00	9.80

Save time and money with these stock blanks.—

Also, prices on request for Blanks for other make machines or for Blanks made of HIGH COBALT STEEL.

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West Coast Warehouse: 576 No. Prairie, Hawthorne, Calif.

DRILL and PILOT BUSHINGS
Frictionless —Rotary
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.
Write for details.

GATCO ROTARY BUSHING CO.
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JIG BORING
and
Large Precision Machining
Done to your specifications
We Have 13 Jig Borers
KIDDE PRECISION TOOL CORP.
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MICRO-HEIGHT GAUGE
BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

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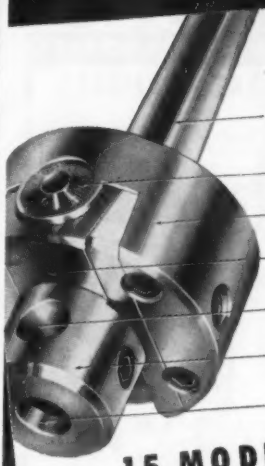
FOR 35 YEARS THE LEADING NAME IN BORING HEADS



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Flynn has studied boring head applications for many years—builds a size and design for every job with all the wanted features Machinists with real appreciation for quality and precision prefer Flynn.

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Ferndale 20, Mich.
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increasing business as wider applications for diamond products are developed.

Heavy Steel Plates Now Available from Stock

J. Frederic Wiese, vice president in charge of sales, has announced that By-Products Steel Co., Division of Lukens Steel Co., Coatesville, Pa., now provides fabricators with a service unique in the steel plate field through its comprehensive warehouse stock of heavy plates, ranging from ½ to 15 in. thick. By making heavy plates immediately available from stock, fabricators' inventory worries and their cost of maintaining heavy steel plate stocks are eliminated. Immediate delivery of a wide range of plate sizes and qualities from warehousing facilities has other advantages. Plate can be shipped full size or flame-cut within close tolerance to specified sizes and shapes, the latter saving scrap losses, and the fabricator pays freight only on that part of the plate that is actually required.

The shapes are cut from "as rolled" mill plate to the customer's exact sketch or dimensions, involving only one gas-cutting charge. Current sizes and qualities carried in the extensive stock range from ½-in. plate, measuring 200 x 100 in., to 15-in. plate, measuring 140 x 80 in., with tensile strengths of different specifications ranging from 55,000 to 85,000 pounds per square inch.

REID

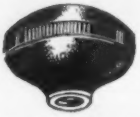
TOOL ROOM ACCESSORIES

CONTROL BALL HANDLES

Round Plastic

Oval Plastic

Round Steel



Mushroom Plastic

The REID Line also includes c.i. hand knobs, hand wheels, machine handles, compression springs and scores of other needed tool room items.

FREE NEW 52-Pg. CAT.

REID TOOL SUPPLY CO.

Muskegon Heights, Michigan

Glen Powless Wins Norgren Certificate of Merit

The important role of handicapped workers in business and industry was exemplified recently at the C. A. Norgren Co., Englewood, Colo., when Glen

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

HEIMANN MFG., CO. ● URBANA, OHIO

Powless, burr room worker, won an award of $41.00 and a certificate of merit in the firm's suggestion program. The presentation of the award was made by C. Neil Norgren, vice president of the firm, at the monthly meeting of employees. Mr. Powless' award came from a suggestion he made for a jig, to hold regulator valve cages during the burring operation,

C. Neil Norgren, vice president, C. A. Norgren Co., Englewood, Colo., is shown presenting a certificate of merit to Glen Powless, handicapped burr room worker.

which would speed up the work and protect the valve seat during the process. It was his first suggestion made in his 20 months with the company.

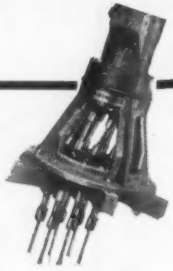
In winning this award, Mr. Powless proves the value of handicapped workers in industry, not only in filling all the requirements of the job but also in making valuable contributions to the improvement in production efficiency.

Send for Woody Spencer's Handy Tapping Guide . . . all arranged for quick, easy tapping reference. IT'S FREE! Hangs on wall or lies flat on desk.

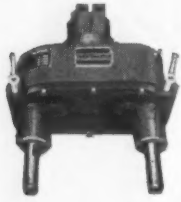
The Wood & Spencer Company

1934 E. 61 ST. • CLEVELAND 3, OHIO

Yes!...
THRIFTMASTER
makes ALL TYPES of DRILLHEADS



Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From ½" Minimum Centers up. Capacities to 1" in Steel.



Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction.

Special Fixed Center Drillhead . . . Full Ball Bearing Construction.

- **We Stock or Can Build the Right Drillhead for Your Job.**
- **Write for Complete THRIFTMASTER Catalog or phone for a rush, on-the-spot quote.**

Subsidiary of Thomson Industries, Inc.

THRIFTMASTER *Products Corporation*

1002 N. PLUM ST., LANCASTER, PENNSYLVANIA

Also Makers of

DORMAN AUTOMATIC REVERSE TAPPERS

Producto Machine Moves Rochester Branch to New Quarters

P. R. Marsilius, sales manager of The Producto Machine Co., Bridgeport, Conn., has announced that the company's Rochester branch has moved to new quarters located at 1300 Mount Read Blvd., Rochester 6, N. Y. The new building will house a die set assembly plant and will carry a more complete stock of catalog die sets, diemaker's accessories and toolroom equipment. David S. Hodgson, district sales manager, will be in charge of the new operation.

Cosa Corporation Forms Associated Company to Serve Ohio

Cosa Corp., New York, N. Y., importer of Swiss and German machine tools, has announced the formation of a new associated company known as Cosa Corporation of Ohio. Sales and service throughout Ohio will be handled from the new office and showroom located at 3315 Brookpark Road, Parma, Ohio, with William Jenks as manager. The Ohio area was formerly covered by another associated company, Detroit Cosa Corporation. That organization, operating under the new name of Cosa Corporation of Detroit, will now serve eastern Michigan. New and larger office and showroom of the Detroit firm are located at 20118 James Couzens Highway, Detroit 35, Michigan. Anton Joen is manager.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS opposite page 468.

ELECTS NEW OFFICERS AND EXECUTIVE COMMITTEE MEMBERS

Richard B. Holmes

M. R. Anderson

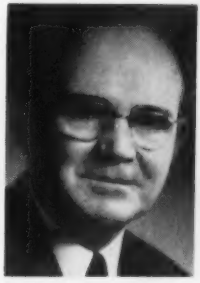
Fred R. Eberhardt

DURING the 38th Annual Meeting of the American Gear Manufacturers Association which was held at The Homestead, Hot Springs, Virginia, June 6 to 9, new officers were elected for one-year terms and four members of the association were elected to serve as new members of the Executive Committee. These new officers and members of the Executive Committee are as follows: Richard B. Holmes, General Manager, Link-Belt Company, Philadelphia, Pennsylvania, was elected President; Marvin R. Anderson, Executive Vice President, Michigan Tool Company, Detroit, Michigan, was elected Vice President; and Fred R. Eberhardt, President, Eberhardt-Denver Company, Denver, Colorado, was elected Treasurer.

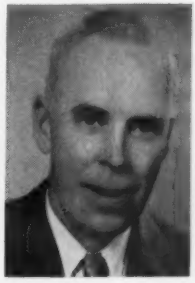
LeRoy R. Brooks, President, Tool Steel Gear & Pinion Company, Cincinnati, Ohio, was elected to the Executive Committee as were John A. Sizer, President, Industrial Gear Manufacturing Company, Chicago, Illinois; T. F. Scannell, General Sales Manager, The Falk Corporation, Milwaukee, Wisconsin; and Ralph E. Rawling, President, Rawling Gear Works, Worcester, Massachusetts.

LeRoy R. Brooks

John A. Sizer



T. F. Scannell

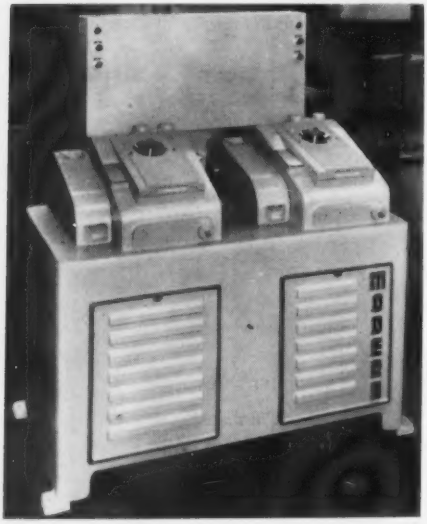


Ralph E. Rawling

new shop equipment

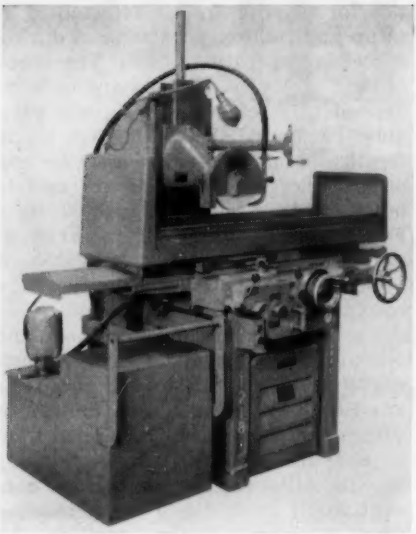
Two-Station Universal Gear Chamfering Machine Has Wide Work Range

Designated as the Model BME-24, a two-station universal gear deburring and chamfering machine which is designed to handle all spur and helical gears, as well as straight and involute external splines, from ⅝ to 6½-in. pitch diameter has been added to the Burr-Master line of production gear finishing equipment manufactured by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich. Essentially a high production machine, its versatility and quick changeover are said to make the Model BME-24 readily adaptable to moderate length or short run production. The two stations can be tooled to perform identical operations at both stations, successive steps on the same gear or deburr and chamfer parts that are totally different. Once started, the machine operates continuously, chamfering the entire tooth form, both sides of the tooth and root, in 1/5 of a second.



Modern Burr-Master Model BME-24 Two-Station Universal Gear Deburring and Chamfering Machine

According to the manufacturer, the operating cycle is very simple, permitting even an inexperienced operator to realize maximum production. A part is placed on the work spindle; this moves a cycle indicator arm to its starting position. Operation is automatic until a signal light indicates completion of the cycle. The workpiece is then removed and the spindle reloaded. The machine, it is claimed, can be easily retooled. Tooling at each station consists of a readily demountable pilot gear, tool block and form cutter. Pre-



Abrasive Machine 1218 Hydrabrasive Surface Grinder

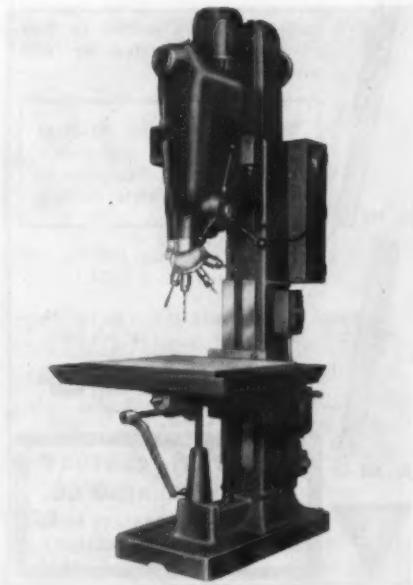
cision tooling is developed for each particular gear or spline on master machines. This tooling is then interchangeable with any like model Burr-Master. Two-way keying and socket screws facilitate positioning. Controls for each station can be reached easily by the operator. The location of each set of controls on its side of the machine prevents operator confusion.

Surface Grinder Features Cross Feed Backlash Eliminator

Abrasive Machine Tool Co., 20 Dunellen Rd., East Providence 14, R. I., has announced the 1218 Hydrabrasive Surface Grinder which features a cross feed backlash eliminator, whereby precision transverse adjustments may be made completely without backlash errors. The backlash eliminator, it is claimed, works in combination with the saddle ball ways to ensure that a movement of 0.0001 in. on the cross feed dial equals a 0.0001 in. movement of the saddle, regardless of the direction in which the adjustment is made. The cross feed handwheel is equipped with a large diameter barrel and easy-to-read vernier for quick, accurate adjustments with minimum danger of reading errors.

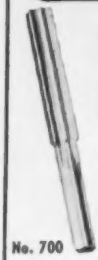
Turret Drilling Machine Performs Six Different Operations

A turret drilling machine with which up to six different drilling and tapping operations, in any sequence, can be done by a single operator at a single station has been announced by Howe & Fant, Inc., 31 Fitch St., East Norwalk, Conn. Speeds, depths and rever-



Howe & Fant Turret Drilling Machine

SUPEREAM



THE ONLY DECIMAL REAMER

with all FLUTES ground Face and Back After Heat Treatment...

No. 700

PREVENTING *CLOGGING or FREEZING of CHIPS for REMARKABLE* SMOOTH REAMING

No. 720

▼ All diameters are held to plus .0002 and minus .000 for close sizing. Size markings are stamped half-way up on shanks so they cannot be obliterated by drill press chucks.

No. 730

▼ ROSE CHUCKING REAMERS Available in the above four styles on request. Designate by "R" in front of style desired.

No. 740

** In Emergency PHONE Libertyville 2-4200.*

No. 700 Straight Flute	No. 730 30° Left Hand Spiral
No. 720 7° Left Hand Spiral	No. 740 7° Right Hand Spiral

TWENTIETH CENTURY MANUFACTURING CO.

ROUTE 176 and BRADLEY ROAD

BOX 429M, LIBERTYVILLE, ILL.

sals for tapping are all determined at setup and require no attention during successive operating cycles. The speed of each of the six turret spindles is independently set and is infinitely variable between 200 and 4,000 r.p.m. Depth stops are individually set for any or all turret spindles and are said to be accurate to less than 0.002 inch. For tapping, automatic reverse at twice forward speed is available at each spindle. The drill capacity of the machine is ½ in. in steel.

The table, counterbalanced head and operating handwheel are easily adjusted by conventional means, and tools are held in standard ½-in. chucks. A permanently mounted tachometer indicates the r.p.m. of the operating spindle. All operating controls are conventionally located and easily reached from a single working position. All spindles are disengaged during indexing. No spindle can be engaged until it is properly positioned, and only the working spindle revolves when it is engaged. All other spindles are motionless and point away from the operator. The machine requires 34 x 50 in. of floor space.

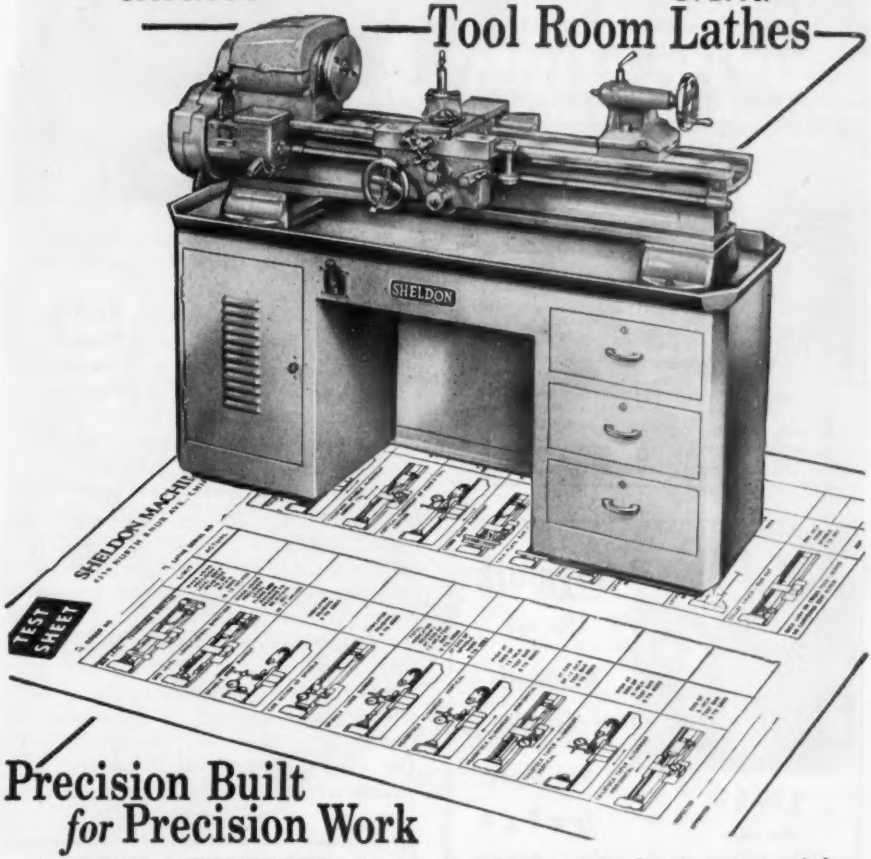
Power Chuck Wrench Chucks Heavy Forgings with Minimum Effort

For use on Warner & Swasey heavy-duty turret lathes, Models 1A, 2A, 3A and 4A, a redesigned power chuck wrench unit which is said to enable the operator to chuck even the heaviest forgings with a minimum amount of effort has been announced by The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio. An electric motor, operating through a controlled torque clutch, does the work. A pressure adjusting nut regulates the gripping pressure of a multiple disc clutch with an infinite number of settings to grip heavy forgings securely or the most delicate work without distortion. A pis-

SHELDON

CHICAGO U. S. A.

Tool Room Lathes



Precision Built *for* Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

WRITE FOR CATALOG

SHELDON MACHINE CO., INC.

4250 North Knox Ave.,
Chicago 41, Illinois

tol grip control handle for the power chuck wrench is mechanically interlocked with the main control lever on the headstock of the machine, providing complete safety of operation. Before the chuck wrench can be engaged, the main control lever must be in the "brake" position. And when the chuck wrench is being used, the main control lever cannot be moved out of the brake position to engage either the forward or reverse drive clutches.

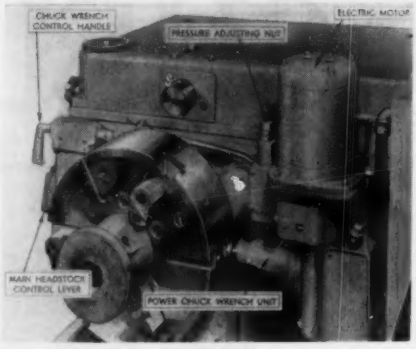
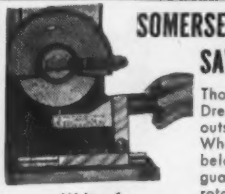


Illustration showing Warner & Swasey Power Chuck Wrench Unit installed on turret lathe

To provide the necessary additional breakway torque when releasing a piece, a solenoid booster sets the torque clutch tight, permitting the full motor torque to be applied to the chuck for opening the jaws. Reversal of direction of the solenoid booster for internal or external chucking is obtained by a selector switch on the machine's control panel. Positioning of the heavy chuck on the machine for engaging the power chuck wrench is said to be easily accomplished by a push-button spindle inching valve on the control panel. Then a slight pull on the pistol grip handle engages the power chuck wrench, and a twist to either left or right opens or closes the chuck with the right amount of pressure. The chuck wrench, it is claimed, provides

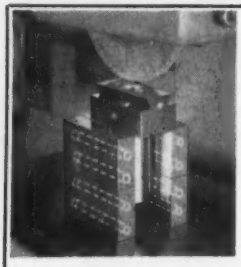


SOMERSET Radius Dresser SAVES TIME

Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearever bearing is dustproof.

Write for illustrated folder. *Immediate Delivery.*

SOMERSET TOOL CO. 320 Virginia St. Hillside, N. J.



Gaymark No. 41 Magnetic Chuck Parallels

$29.95 *PER PAIR*

7/8 x 2 x 4

- Silver Brazed
- Reinforced With 2 Steel Rods
- Precision Ground to .0001 Parallelism
- Adjacent Sides Ground At Right Angles

Individually Priced At $17.50 ea.

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Available In All Sizes
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DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
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Another

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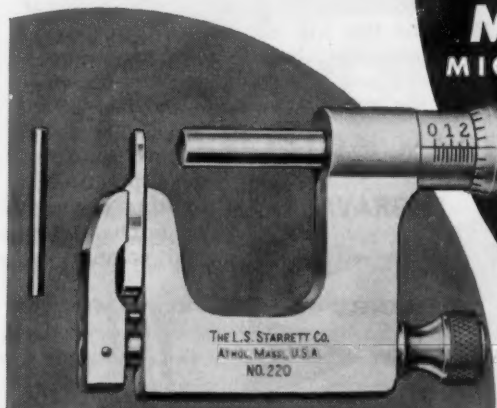
NEW No. 220 MUL-T-ANVIL MICROMETER CALIPER

(Patented)



Starrett No. 220
MUL-T-ANVIL MICROMETER CALIPER
(Patented)
Range 0-1" by .001"
Furnished as shown with interchangeable round and flat anvils, without ratchet stop. Also available with Lock Nut.

- REDUCES TOOL INVESTMENT
- ONE MICROMETER FOR MANY USES
- MEASURES WHERE OTHER MIKES WON'T
- USE WITH STANDARD OR SPECIAL ANVILS
- ANVILS CHANGED QUICKLY, LOCKED RIGIDLY
- ONLY ONE SIMPLE LOCK SCREW ADJUSTMENT

Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR
Prompt delivery
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Quality products

Here is a brand new development in micrometer design . . . a micrometer with multiple interchangeable anvils created with typical Starrett ingenuity to make easy work of a wide variety of difficult measuring jobs. It permits quick, accurate measuring of tubing, cylindrical walls or work of irregular shape . . . from holes or slots to an edge . . . in places difficult or impossible to reach with an ordinary micrometer. Can also be used as height gage.

New Starrett No. 220 *MUL-T-ANVIL* Micrometer is now available as a 0 to 1 inch micrometer caliper. Ask your industrial distributor to show you this indispensable new tool . . . or write for complete information. Address Dept. MD.

New Starrett No. 220 *MUL-T-ANVIL* Micrometer is furnished with two multi-purpose anvils, a round anvil and a double-ended flat anvil. It will also accept special anvils up to 1/16" thick — make your own at low cost or we will make them for you on special order. Anvils are rigidly held in a vise-type frame and quickly interchanged by a single lock screw adjustment.

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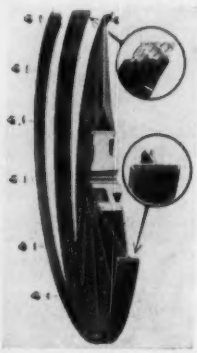
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES
PRECISION GROUND FLAT STOCK • HACKSAWS, BAND SAWS and BAND KNIVES

power chucking without obstructing the spindle bore, thus bar stock can also be gripped as readily as castings or forgings.

Jiffy Tire Is Standard on Carter Rigid Band Saw Wheel

Carter Products Co., Inc., Dept. W, 426 Wm. Alden Bldg., 30 Ionia Ave., S.W., Grand Rapids 2, Mich., has announced the installation of the Jiffy Tire as standard equipment on all Carter Rigid Wheels. This combination supersedes the 30 and 36-in. size Carter Quick Change Tire. The Jiffy Tire, available in all sizes from 14 to 36 in., can be quickly and easily applied, requiring no glue, cement or special tools. According to the manufacturer, the tire will not throw at any speed, being held on the wheel by compression and by a special locking rib which fits into a keyway in the face of the wheel. The tire is molded with unusual precision to assure accuracy in both contour and balance and requires no grinding. Carter Rigid Wheels are precision balanced before installation of the tires; therefore, it is claimed, replacement tires will also have the same contour and balance without rebalancing the assembly.



Exploded view showing installation of Jiffy Tire on Carter Rigid Wheel.

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Mark your own symbols, numbers, lettering, on your small parts, tools, identification and name plates . . easily, simply, quickly . . tracing from a master with the GREEN ENGRAVER.
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Etching attachment and other special equipment for industrial uses are available.
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INSTRUMENT COMPANY
392 PUTNAM AVE., CAMBRIDGE, MASS.

SANFORD BENCH SURFACE GRINDER
MODEL SG

*for Wet*or Dry Grinding!*

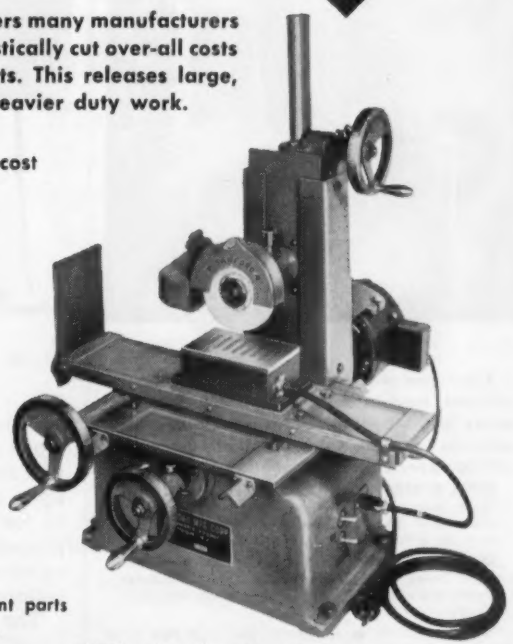
PRECISION • SPEED • SENSITIVITY

A *low cost*, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the *only* low cost Bench Surface Grinder that

- **Grinds to less than .0001" tolerances**
- **Operates without vibration**
- **Assures long life because Meehanite castings are used in its construction**



SPECIFICATIONS—4" traverse —8" longitudinal—6" vertical under 4" wheel. Approximate weight 160 lbs.

Complete details are included in illustrated bulletin. Send for your copy today.

Reconditioning facilities, replacement parts and special attachments are available. Send for price list.

**With optional equipment*

SANFORD MANUFACTURING CORP.
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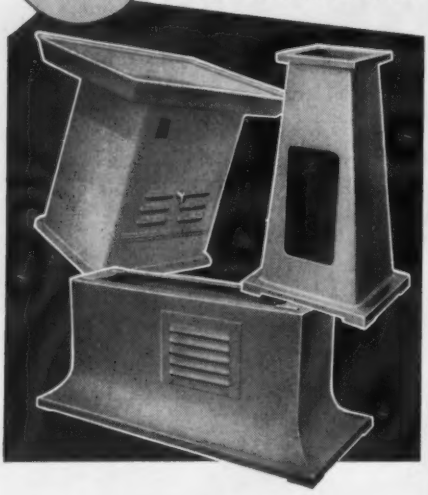
machine bases

FABRICATED TO YOUR SPECIFICATIONS



Fabricated Machine Bases lend themselves to efficient, modern design and utilize the economies of welded steel. By reappraising your products for steel, you can initiate many cost-cutting opportunities in manufacturing because:

STEEL DESIGN USES LESS MATERIAL—Steel is three times stronger than iron and fabricated units have all the inherent strength and toughness to withstand shock, strain and vibration.

MANUFACTURING COSTS ARE LESS — Fabricated Bases adapt themselves to design, improvements and changes at any time with the minimum of cost.

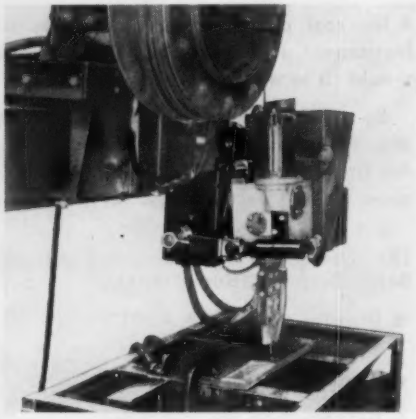
Send blueprints to Littleford. See how Fabricated Bases can save you money.

LITTLEFORD

LITTLEFORD BROS., INC.
433 E. Pearl Street, Cincinnati 2, Ohio

Automatic Welding Equipment Produces 4-Inch Wide Beads in Single Pass

The Lincoln Electric Co., Cleveland 17, Ohio, has announced automatic welding equipment which is designed for producing beads up to 4 in. wide in a single pass. The equipment, designated as "Spreadarc," is an attachment that mounts on a standard Lincolnweld automatic head and oscillates the head back and forth at right angles to the direction of travel. The amount of oscillation can be controlled to produce a pad of weld metal up to 4 in. in width in a single pass. It may be used to build up a layer of hardsurfacing metal or to build up with mild steel. Under proper conditions, it may also be used to overcome poor fit-up conditions encountered in welding a joint.



Lincoln "Spreadarc" Attachment mounted on Lincolnweld Automatic Head

The attachment may be installed on Lincolnweld heads now in use without any major changes required. It is powered by its own variable speed electric motor which, through an eccentric, oscillates the entire welding head assembly. The width of the oscillation is controlled by an adjustment of the ec-

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REID BROTHERS COMPANY, INC.

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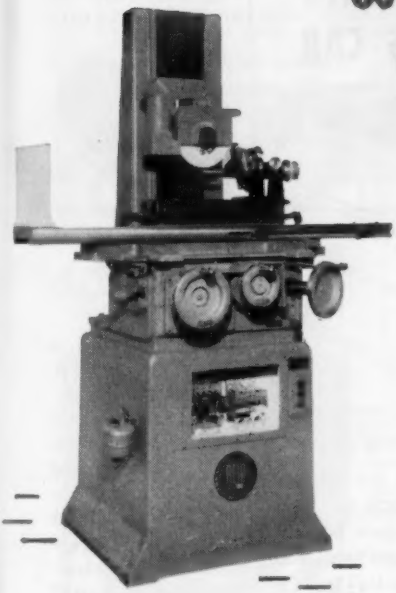

see our catalog in MACHINE TOOL CATALOGS or write for copy

It's strictly a dollars and sense proposition. The cost of a new surface grinder is not high in relation to the benefits that accrue from more accuracy, better quality finishes and ease of operation.

And it certainly makes sense, in today's competitive business world to replace older type grinders that invite work-spoilage and rejection.

If you're still using over-age surface grinders, it will be good "insurance" to talk with your Reid dealer today.

He'll show you why modern Reid Grinders will increase efficiency in your toolroom.

For the full story on Reid Surface Grinders, please write for Bulletin 618-12

Reid Brothers Company, Inc.

ELLICOTT STREET • BEVERLY, MASSACHUSETTS

centric and the number of oscillations per minute by a rheostat control of the motor speed.

The speed and the width are controlled to meet varying requirements. The attachment may be turned off completely when normal straight welding beads are desired. Hardsurfacing with the equipment employs the hidden arc welding process and is said to retain all the advantages of speed, uniformity and economy normally associated with the process when used for normal joint welding. Automatic hardsurfacing can be applied to flat and round surfaces.

Valve Meters Flow in One Direction and Allows Free Flow in the Other Direction

Designated as the Model 3620, a ⅜-in. flow control air valve which meters flow in one direction and allows free flow in the opposite direction has been announced by Rivett Lathe & Grinder, Inc., Dept. MM R5, Brighton 35, Boston, Mass. The valve features an anodized aluminum body and a nylon poppet. A corrosion-resistant adjusting screw has a slotted hex head which may be turned with a wrench or screw driver. Tightening the hex nut on the opposite end of the adjustment screw locks the setting. The valve is recommended for 150 p.s.i air or 300 p.s.i. oil or water operation.

Rivett Model 3620 ⅜-Inch Flow Control Valve

DE·STA·CO HELPS PUT SKYLIGHT IN THIS CAR

Photos courtesy Ford Motor Company, Detroit Macoid Company.

Eleven Model 210 TU De·Sta·Co Toggle Clamps position and hold hot plastic sheets during the vacuum molding process used to produce transparent car roofs for Ford and Mercury automobiles. This fixture requires positive holding pressures during the 10 minute draw of Plexiglass sheet heated to 300° F. Two-second engagement and release of the De·Sta·Co Toggle Clamps speeds production, assures accuracy.

De·Sta·Co Toggle Clamps are available in over 45 models, with positive holding pressures up to 4000 pounds, for any work holding application.

Write for free catalog today.

DE·STA·CO DETROIT STAMPING CO.

349 MIDLAND AVE. • DETROIT 3, MICH.

MARK OF QUALITY

STANDARD STEEL SPECIALTIES

- **MACHINE KEYS**
  We can supply a complete line of finished machine keys including gib head and taper keys, rod keys, round end keys, etc.
- **WOODRUFF KEYS**
  Complete stock of standard keys on hand for prompt shipment. Made from open hearth or alloy steel.
- **TAPER PINS**
  Available in sizes 7/10 through 10 and lengths from 3/4 inch to 6 inches. Others made to specifications.
- **MACHINE RACK**
  Can furnish rack from almost any size blank and pitch as well as length to form continuous sections.

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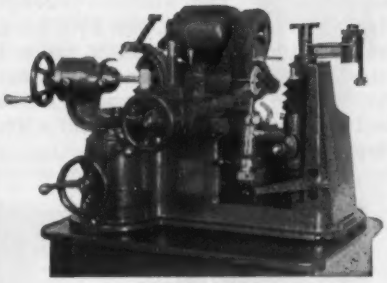
STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

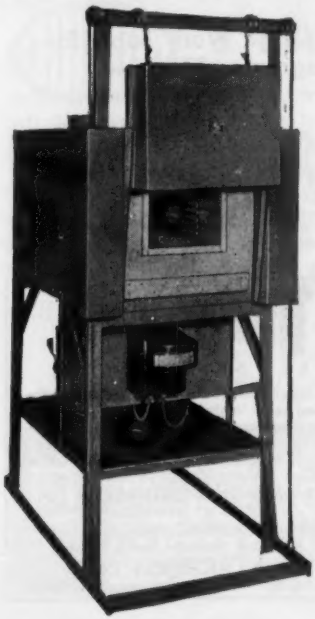
HYBCO TAP GRINDER



MODEL 1100

- **Capacities No. 0 Machine Screw to 1½" Hand Taps.**

HENRY P. BOGGIS & CO.
708 East 163rd Street
Cleveland 10, Ohio



"MULTI-INSULATION"

is the secret of . . .

HUPPERT

Floor Model Furnaces

These sturdy production type Huppert electric furnaces not only attain highest efficiency, but also cut operating costs to a minimum through the unique Huppert method of using multi-insulation surrounding all sides of the heating chamber. Heat range —continuous up to 1850° F., intermittent operation to 1950° F., can also be built for 2300° F. operation.

This furnace comes complete with an indicating electronic temperature controller, and a tight seating, wedge-type door is used. Standardly furnished for 220 V. AC single or 3 phase operation. (110 V. or 440 V. models to order).

This model built in 20 different sizes.

Model No. 16 illustrated—12"x8"x18"—$925.00 complete

Write for literature on complete line of Huppert furnaces and ovens.

K. H. HUPPERT CO.
6841 Cottage Grove Avenue **Chicago 37, Illinois**
Manufacturers of Electric Furnaces and Ovens

Machine Tool Lighting Unit Has Tension Disc Arm Joints

A newly designed (1954) Localite for lighting machine tools, inspection uses, and assembly benches has been announced by The Fostoria Pressed Steel Corp., Fostoria, Ohio. Arm joints are of a tension disc design which is said to provide easy, smooth adjustability with only one hand. The reflector rotates 360 degrees, and a universal base affords either vertical or horizontal mounting. The base is also adaptable to outlet boxes, and a collet located above the base revolves 360 degrees. Wiring includes a McGill industrial socket 4101-FL with a Levolier switch and 8-foot, POT-32, 18-2, heavily-insulated, oil-resistant wiring with a molded plug.

Fostoria 1954 Localite

The Fostoria 1954 Localite is available with one, two, or three arms and various type reflectors.

Extra-Large Work Table for Engraving Machines

An extra-large auxiliary work table attachment which is designed for the "Preis-Panto" Model 2D-4 Engraving Machine has been announced by H. P. Preis Engraving Machine Co., 657 U. S. Route 22, Hillside, N. J. The extra-large work table measures 18 x 24 x

Looking for

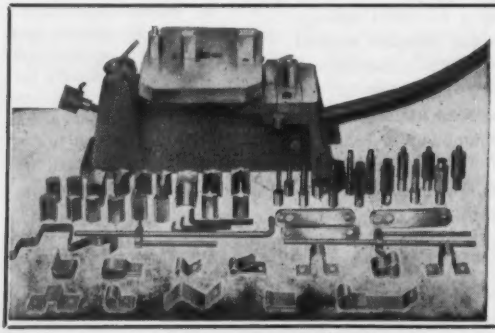
a WIDER SELECTION?

ACE has just what you are looking for—*the finest Drill Bushings ever made!* Now over 22,000 A.S.A. and other standard sizes *plus specials.* Also hexagon, knurled or serrated bushings for use in soft or castable materials.

Always Specify Ace!

ACE DRILL BUSHING CO., INC.

5407 FOUNTAIN AVENUE
LOS ANGELES 29, CALIF.



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies ,Etc.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M Kalamazoo, Mich.

CAMS

MADE TO YOUR SPECIFICATIONS

— Except Screw Machine Cams —

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

37 Farrand St. Bloomfield, N. J.

Portable Sandblast Gun

—Complete— simply connect to air line

Rugged

•

Efficient

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Guaranteed

$19.50

A Real Performer Handy in any shop

Box 885 M

LINDBERG PRODUCTS CO., Los Gatos, Calif.

The LINLEY JIG BORER

Put your small jig boring jobs on this precision machine . . .

Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents.

Table movement: 6" x 10"; table size, 7" x 17½".

Send TODAY for complete information.

LINLEY BROTHERS CO.

661 STATE ST. EXT., BRIDGEPORT 1, CONN.

CHICAGO

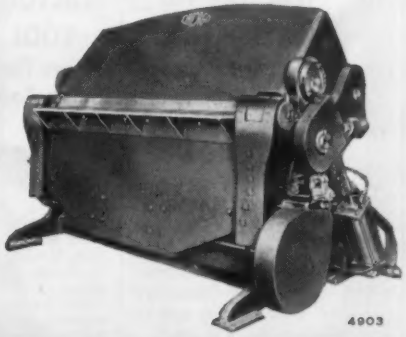
STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE and SHEET METAL

Special Bending Brakes
Double Folder Brakes



4903

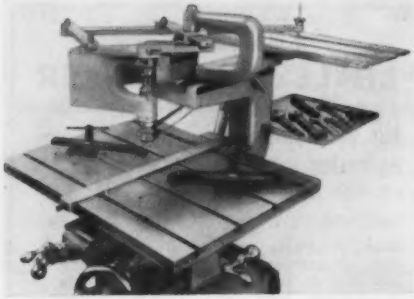
DREIS & KRUMP

MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO

STEEL BENDING BRAKES
BOX and PAN BRAKES
PRESS BRAKES



"Preis-Panto" Model 2D-4 Engraving Machine equipped with extra-large "Preis-Panto" Auxiliary Work Table Attachment

1 in. thick and is designed so as to be readily mounted on top of the existing work table of the engraver. According to the manufacturer, the auxiliary table can also be used with almost any other type of engraving machine. The work table is said to permit the use of standard clamps for holding work by means of four T-slots that run the length of the table. The unit is provided with a clamping T-square for lining up work, an extension for the work table crank handle so that adjustments of the table position can be conveniently made and four mounting bolts for quick mounting to the standard work table. The table is also furnished with two extra-large clamps for holding any size work that the table will accommodate.

The large work table is made of stress-relieved Meehanite casting which is seasoned and machined accurately flat. When used on the Model 2D-4 machine, the maximum distance from the work table to the spindle cutter chuck is 2¾ in. when the table is mounted over the machine column. When the table is mounted to the extreme left of the work table, it can be lowered so that panels or boxes up to as much as 5 in. in height can be engraved.

WALTON TOOLS TIME AND LABOR SAVERS FOR MACHINE SHOPS AND INDUSTRY

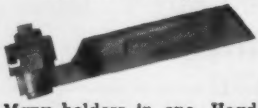
WALTON TAP EXTRACTORS

Cut costs of Removing Broken Taps

Universally used for removing stubborn, balky taps that break off deep in threaded work. Quick, easy, inexpensive. Will not damage threads. In 2, 3 and 4 flute styles—sizes No. 4 to 1½".

WALTON-AMERICAN TOOL HOLDERS

Save Time and Labor on Tool Changes.



Many holders in one. Head will swivel around an entire circle. May be set for straight, right or left hand offset positions. Will hold with perfect grip any size square or round tool bit or boring bar from ⅛" to 7/16".

"*REPS" PIPE & STUD EXTRACTORS

Reduce Labor Costs for Removing Pipes, Studs and Screws.

For removing broken pipes or studs that defy movement. "Reps" makes a strong four point grip without hammering or pounding. Hardened steel. Pulls rather than reams. In sizes, for every pipe from ⅛" to 2", every stud and screw from ⅜" to 3½".

(*Reps. Tool Company, Inc., a Walton affiliate.)

Sold by leading dealers, or write direct for catalog No. 10 of Walton Tools and details of 30 day free trial offer.

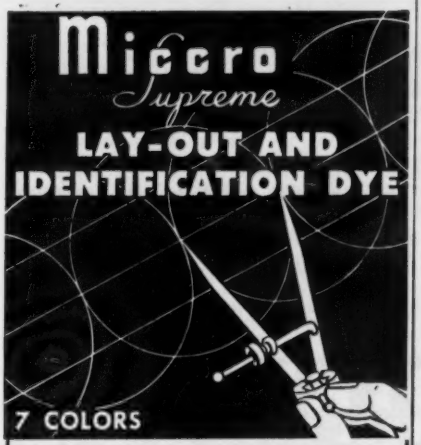
THE WALTON COMPANY, Hartford 10, Conn.

PRECISION PINS

Dowel — Straight
Countersunk — Taper
Made to Blueprint
CENTERLESS GROUND
TO ± .0001" ACCURACY
.030" to .125" Diam.
.125" to 2." Length
Complete Centerless Service
Since 1931

COMMERCIAL
CENTERLESS
GRINDING CO.
6605 CEDAR AVE. Phone EN 1-3412 CLEVELAND 3, O.

Micro Supreme
LAY-OUT AND IDENTIFICATION DYE



7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY
8615 Grinnell Ave. • Detroit 13, Mich.

Webber GAGE
43 BLOCK SET
$165 Accuracy ± .000008"

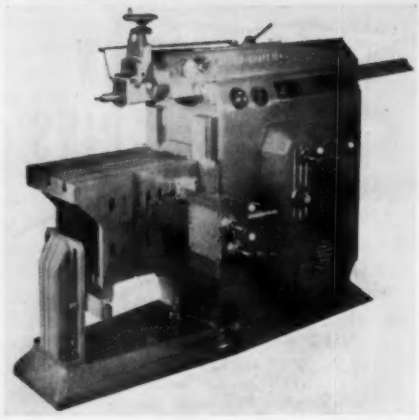
The ideal set of Gage Blocks for the small shop, or to use as an "extra" in the large shops where additional blocks will save time and also improve efficiency.

This popular 43 Block Set includes the most used sizes. Rigidly tested to meet the exacting Webber Gage Standards of surface finish, flatness and parallelism. Accuracy guaranteed ± .000008".

Webber GAGE CO.
12899 Triskett Rd., Cleveland 11, Ohio
Largest exclusive manufacturers of precision gage blocks

Shaper Is Compact, Simple and Accurate

Morey Machinery Co., Inc., 383 Lafayette St., New York 3, N. Y., is now offering the "Hermes" Shaper which is said to be compact, simple and accurate. The shaper is easy to operate and requires only standard and inexpensive types of tooling. Cast iron parts of the machine are high tensile Meehanite which is claimed to be stable and free from distortion. All alloy steels are chromium-nickeled. The shaper is available in 8, 10, 14, 18, 22, 26 and 30-in. sizes.



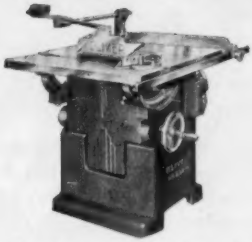
"Hermes" Shaper

Extra Heavy-Duty Universal Boring Bar Holders

Tool Specialties Co., 390 Hillside Ave., Hillside, N. J., has announced an addition to its line of heavy-duty universal boring bar holders for engine lathes. The extra heavy-duty unit features two bars, 1½ and 2 in. in diameter, with ⅝-in. holes broached square at one end and at a 45-degree angle at the opposite end. A sleeve is provided with the smaller bar. The complete unit weighs 35 lb., without bars, and

DYKEM
STEEL BLUE
Stops Losses
making Dies and Templates
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.
DYKEM STEEL BLUE
SPECIMEN
With DYKEM Steel Blue
Without DYKEM Steel Blue

Cut and mill aluminum and non-ferrous metals with this "OLIVER"



This production machine cuts aluminum, brass, aluminum and brass alloys, etc. Fitted with coolant pump. Table 74"x44" has drain trough around edge. Similar machines of larger capacity also available. Write for full details.

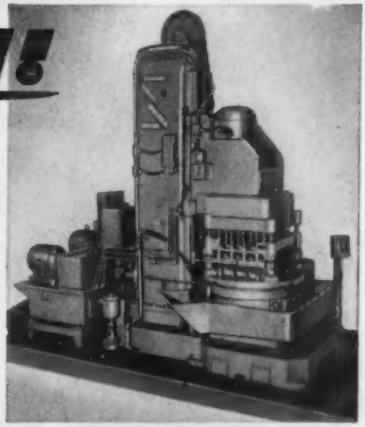
OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICH.

GRANT RIVETERS

• Pioneers in the riveting field. Head rivets from smallest to ¾" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. *Write for literature—and don't forget to send samples.*

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

PRECISION!



Precision means excessive exactness, the QUALITY reflected in this STANDARD DRILLMASTER machine now in operation in a large automotive manufacturing plant. This STANDARD DRILLMASTER 4-Station machine is designed for *spotfacing* and *chamfering* connecting rods.

The machine is equipped with a 36-inch hydraulic Index Table, carrying a 4-Station, 4-Position fixture with automatic clamping and unclamping. Mounted in the vertical column is a 24-Spindle Head, complete with Bushing Plate, having special anti-friction bearing type bushings for tool support and alignment.

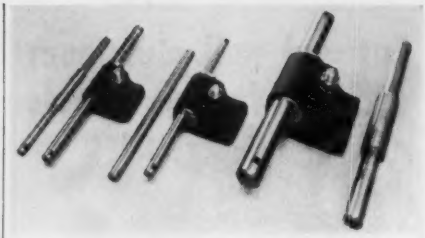
Hydraulics and Electrics are to J.I.C. *standards*. John S. Barnes hydraulics are employed. Production is 460 *pieces* per hour net.

WRITE FOR COMPLETE TECHNICAL INFORMATION.

STANDARD MACHINE S.O. 4555

UNITED STATES SALES REPRESENTATIVES: ARNOLD J. WERNER CO., NEW CENTER BUILDING, DETROIT 2, MICHIGAN

STANDARD MACHINE AND TOOL CO., LTD.
WINDSOR, ONTARIO



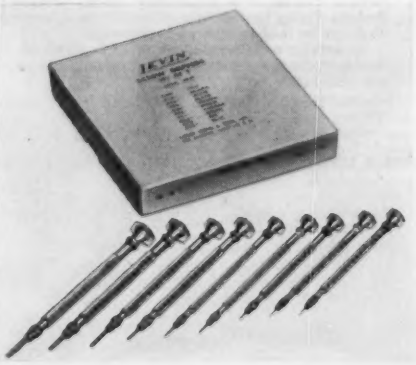
Tool Specialties Extra Heavy-Duty Universal Boring Bar Holders

the off-set position varies from 3½ to 4-5/16 inches. The boring bar holder is suitable for lathes which have from 22 to 30-in. swing.

Small Screw Driver Is Designed for Fine Watch or Instrument Work

Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif., has announced a screw driver which is suitable for fine watch work or instrument work. The screw driver is available in nine blade sizes; namely, 0.016, 0.020, 0.026, 0.030, 0.035, 0.041, 0.055, 0.070 and 0.094 inch. The blades are reversible and replacements may be purchased separately. The screw driver is available in a complete set of nine or in sets of three.

Levin Small Screw Driver Set



W.H.O.* SAYS:

"Don't have FITS over FASTENERS, have fasteners that fit."

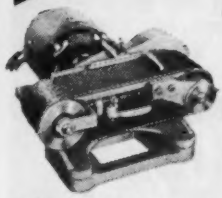
For the finest in milled-from-the-bar cap screws, set screws, coupling bolts and milled studs

DON'T GET STUCK, STICK TO THE ONES MADE BY

*Wm. H. Ottemiller Co. YORK, PA.

DOES IT BETTER
DOES IT FASTER

SIMPLEX-M
ABRASIVE BAND GRINDER

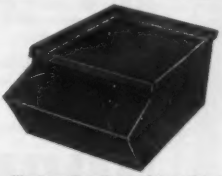


The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.
333 Nassau Avenue, Brooklyn 22, N. Y.

"Stack Up"



Sterling Bin Front "Top Rim" Steel Stacking Box.
Size: 18" x 12" x 6".

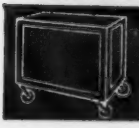
THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

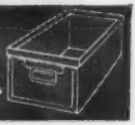
Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

Sterling "Top Rim" Steel Stacking Box with drop handles.
Size: 18" x 12" x 6".

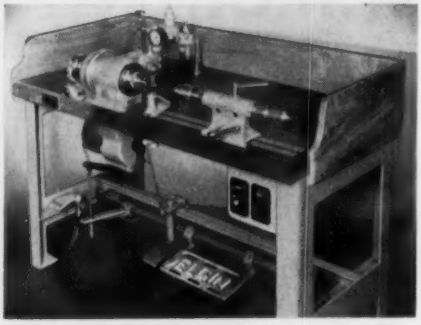


Sterling
Quality Handling & Storage Equipment



Lathe Provides Desk High Bed and Spindle

A highly versatile production lathe, designated as the Desk Model, which provides a desk high bed and spindle for the convenience of women operators, plus an operating lever and pedals placed for fast and easy action, has been announced by Elgin Tool Works, Inc., Dept. II, 1771 Berteau Ave., Chicago 13, Ill. The lathe, it is claimed, provides for instant spindle run-stop and collet position control, thereby making it an ideal machine for short turning, facing, crimping and many other operations. The machine is available in two models; namely, the 4 P 7 with a ¾-in. draw-in type collet and the $\frac{1}{16}$-in. model with a stationary type collet. The lathe has a 7-in. swing with 15 in. between centers and provides for speeds up to 4,000 r.p.m. The machine can be equipped with compound slide rest, double cross slide, and six-hole turret.



Elgin Desk Model Lathe

(The above write-up was previously published on page 344 of the June issue of this magazine; however, the incorrect illustration was used. The illustration herewith is the one that should have been included with the write-up.)

RAYMAC *Solid Carbide* DRILLS and REAMERS

Raymac drills cut hardened metal . . . do not burn or anneal. Feature operational speeds of 350 to 600 RPMS depending on size and hardness of metal.

Raymac solid carbide reamers are custom designed for individual jobs.

Write for catalog No. 12

RAYMAC MANUFACTURING COMPANY INC.
3729 CASS AVENUE, DETROIT 1, MICH.

WALTHAM SUB-PRESSES . . . *for precision work*

Exact alignment and constant precision can be maintained throughout life of die. Made in 9 sizes. Babbitt bearing is tapered on outside and can be forced downwards. This reduces inside diameter to fit plunger when latter becomes worn through use.

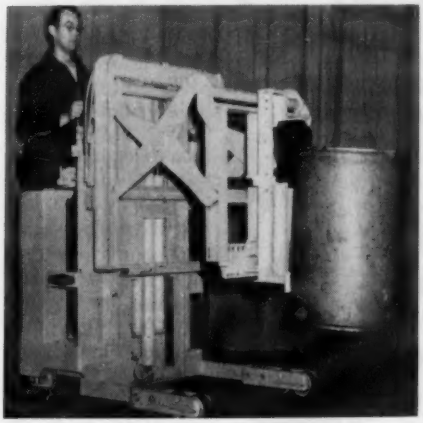
Write for further information.

WALTHAM MACHINE WORKS

BOX 48
WALTHAM, MASS.

Barrel Handling Attachment for All Reach Fork Trucks

A barrel handling attachment which is designed for use on all reach fork trucks has been announced by The Raymond Corp., 88-124 Madison St., Greene, N. Y. With the device, it is said to be possible to stack barrels from aisles only 6 ft. wide. The engaging mechanism travels forward 24 in. through the truck's scissor arm arrangement to engage or deposit the barrel. The attachment is a simple mechanical device which grips under pressure and releases when the load is deposited. According to the manufacturer, loads up to 1,000 lb. can be multiple stacked, tight together, from very narrow aisles and in confined areas.



Raymond Barrel Handling Attachment in use

The grab attachment is readily interchangeable with standard elevating forks for pallet stacking and can also be furnished on the company's line of narrow aisle straddle trucks. With the forks in place, pallet loads up to 4 ft. long weighing 2,000 lb. can also be stacked in 72-in. aisles and up to heights of 152 inches. Because the forks extend out ahead of the base legs, multiple pallet sizes can be handled.

HOW TO INSURE TOP METALWORKING PERFORMANCE for only $1.00

Send for a trial order of CMD ANTI-SCORING LUBRICANTS

For top performance on lathe centers, grinding, press fit, stamping, die posts and many other operations—CMD ANTI-SCORING Lubricant can't be beat. It makes your operations smoother, faster, easier, and of course more profitable. Prevents scoring, seizing, galling... all bugaboos in modern machining work. This trial order will start *you* on *your* way to top performance where a high pressure lubricant is needed. You will be surprised to find how long it lasts. Get yours today in both oil and grease consistencies.

TRIAL ORDER— TWO FOUR OZ. TUBES $1.00

Send me my order of CMD right away!
Bill me ☐ Bill my company ☐

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Company Name_____

Address_____

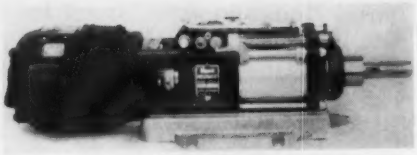
City_____ State_____

Chicago Manufacturing and Distributing Co.
1910 West 46th St., Chicago 9, Illinois

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

Drill Unit Uses Concentrically Mounted Electric Motor Drive Assemblies

Designated as the Model 24 Holomatic, a drill unit which is rated at 1 h.p. and which uses concentrically mounted electric motor drive assemblies for spindle power has been announced by Hause Engineering, Montpelier, Ohio. Advance and retract thrusts are developed by air pressure with single or multiple feed rates and rapid travel movements established by adjustable hydraulic controls. The stroke is said to be adjustable to a full 4 inches. According to the manufacturer, automatic, semi-automatic or manual cycling, skip drilling, back feeding, manual jogging and positive stop with dwell operations can all be easily achieved. The built-in four-way air control valve can be actuated either by air or electric solenoid valves. Electric motor drive assemblies are available in ½, ¾ and 1-h.p. sizes with 1,200, 1,800 or 3,600 r.p.m. speeds.



Hause Model 24 Holomatic Drill Unit

Operating on air supply pressures of from 50 to 150 p.s.i., the unit develops a thrust which equals 8.5 times the input air line pressure. Depth accuracies to 0.0005 in. can be maintained by the use of positive stop and dwell.

NOW! JIFFY (Carter) TIRES

STANDARD EQUIPMENT ON ALL CARTER RIGID WHEELS

Proof of acceptance

is the use of Jiffy Tires in all sizes, from 14" to 36" as standard equipment on 14 leading band saws. Manufacturers prefer the Carter combination because:

- *Jiffy Tires can be changed in 10 minutes without special tools.*
- *Provide 2 to 4 times more wear.*
- *Provide perfect traction and balance.*
- *Assured safety . . . won't throw at any speed, held on by compression.*

AVAILABLE IN SIZES FOR ALL BAND SAWS

Supersedes the old Quick Change Tire

CARTER PRODUCTS COMPANY, INC.

426 Wm. Alden Smith Bldg. 30 Ionia Ave., S. W.
Grand Rapids 2, Michigan

Gage Provides New Approach for Checking Pitch Diameters of Gears

Designated as the Model 202P Series, a gage which is said to provide a new approach for inspecting pitch diameters of spur gears, helical gears, splines and chain sprockets has been developed by Federal Products Corp., 4145 Eddy St., Providence 1, R. I. Cylindrical gaging contacts are used on the gage, and the upper contact is free to swivel while adjusting the gage to the master. When the upper contact is seated properly in relation to the lower contact, it is locked in position. This arrangement is said to provide maximum stability. An adjustable rear guide helps to locate the gage in the proper spaces between the gear teeth. Pitch diameters of gears having either an even or uneven number of teeth can be inspected with the gage. A thumb lever lifts the upper contact so that it will clear the maximum diameter of the gear. The contact is then allowed to settle between the teeth and find its own position. The operator cannot influence this operation with the thumb lever. The upper contact is spring loaded to offset the weight of the gage and any reasonable pressure.

Federal Model 202P Series Gear Gage in use

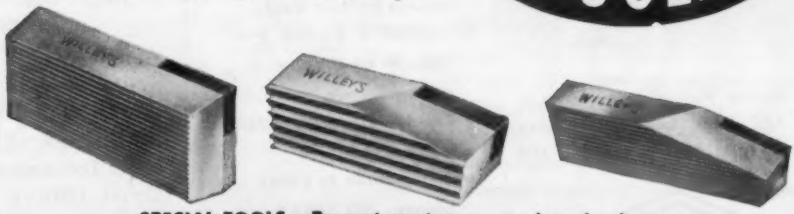
The gage is available in five sizes in

SERRATED CUTTER BLADES

Carbide Tipped with Willey's Metal

Serrations are ground *after* heat treating, for greatest accuracy. Send your prints or a sample of the blade you are now using. Also specify grade of carbide—or the material to be machined. We also make solid carbide blades for various cutters. Write for prices and catalog.

WILLEY'S TUNGSTEN CARBIDE TOOLS



SPECIAL TOOLS—Prompt quotes on receipt of prints

WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

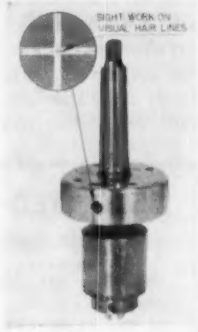
1342 W. Vernor Highway Detroit 1, Michigan

the regular series, each of which has one full inch of adjustment. The gage is portable and easy to use at the machine, at final inspection or for statistical quality control. Among the construction features is a guard to protect the dial indicator against careless handling. The gaging contacts are made of tungsten carbide for long wear, and both contacts are removable to accommodate gears of different circular pitch.

Toolmaker's Drill Chuck Incorporates Optical Locating Device

Bansbach Machinery Co., 223 N. Cicero Ave., Chicago 44, Ill., is now marketing the MSE Toolmaker's Drill Chuck that comprises a high precision chuck onto which has been built a totally enclosed optical unit for sighting right down the spindle center, through the chuck, onto the workpieces markings.

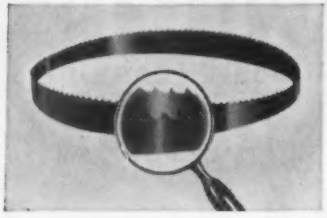
According to the manufacturer, the optical location device is constructed so that it will not move or get out of adjustment in normal use. Designed for use on milling machines, lathes, or drilling machines, the MSE Toolmaker's Drill Chuck is supplied with either a No. 2 or No. 3 Morse taper hardened and concentrically ground shank.



MSE Toolmaker's Drill Chuck

BARNES HACK SAWS — BAND SAWS BARNES

BARNES WELDED BAND SAWS ARE SUPERIOR!



Barnes Welded Band Saws in ARC LINE; Raker and Wavy Set and Barnes SKIP TOOTH

LOOK AT THESE BARNES Features...

- Special equipment assures perfect welds.
- Controlled anneal provides flexibility and strength.
- Consistent quality—rigid inspection.
- Tailor-made to exact length—NO SCRAP.
- Prompt delivery from local Distributor's stock.

DETROIT BARNES 1814

W. O. BARNES CO., INC.
1288 TERMINAL AVE., DETROIT 12, MICH.

Press Brake Operates at 70 Strokes Per Minute

For high speed punching and automatic feeding applications, The Cincinnati Shaper Co., Cincinnati 25, Ohio, has announced a high-speed Cincinnati All Steel Press Brake which operates at 70 strokes per minute and which is equipped with a specially arranged ram. The machine has an all steel rolled plate construction with an interlock frame, push-button control to the ram adjustment, micrometer indicators on both ends of the machine, centerline loading, weld-free joints and automatic pressure lubrication. Additional features of the press brake include the planing of a double hook tongue in the ram with the bed member doweled to the housings to withstand a 20-ton stripping load.

Cincinnati All Steel Press Brake

Automatic Travel and Discharge Bucket Handles Dry Materials and Moist Mixtures

A traveling bucket for handling dry granulated or lump materials and moist mixtures, including clay batch,

Save up to 30%

cost less to own *and* operate

Queen City

grinders and buffers

So good they're guaranteed: "try one for 30 days . . . if you're not satisfied, return it." It makes cents . . . and dollars . . . to buy equipment like that at prices 20 to 30% under competing makes!

The complete range of Queen City Grinders and Buffers . . . floor and bench types . . . is described in newly-revised literature.

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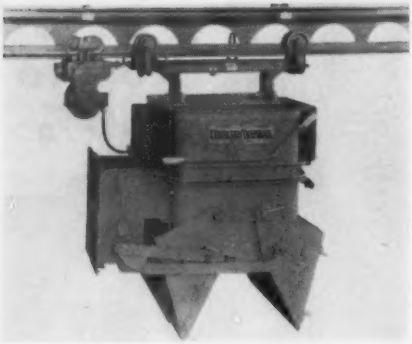
QUEEN CITY MACHINE TOOL CO.
3911 Kellog Avenue, Cincinnati 26, Ohio
"High Quality—Low Cost—For over 50 Years"



Cleveland Tramrail Automatic Travel and Discharge Bucket

has been developed by Cleveland Tramrail Division, The Cleveland Crane & Engineering Co., 6427 E. 281st St., Wickliffe, Ohio. Designed for use on Cleveland Tramrail overhead track and crane systems, the bucket carrier is powered by a tractor drive.

The unit illustrated is one of several engineered for the automatic dispatching of loads of damp clay batch from a mixer to two presses. The travel route includes a lift of 25 feet. The bucket has a capacity of 22.5 cu. ft. and is rated at 2,000 lb. It has a split-hinged gate that is operated by a motor which is protected by a box enclosure. The unusually wide opening of the gate facilitates discharge of slow moving, tacky materials. The cycle of operation for this particular unit begins by pouring clay batch into the bucket at the mixer at low elevation. The mixer operator then presses a push button on the wall, and the track section with the bucket carrier is elevated 25 feet. In high position, the track section interlocks with the overhead track system. The bucket carrier remains here until called for at one of the two mixers. When batch is needed at either the No. 1 or No. 2 press, the press operator presses the correspond-

IF **You Machine Irregular or Delicate Parts and must make special chuck jaws —**

THEN

YOU can save Time and Money when making work holding tools for small parts of square, rectangular or irregular section.

Cerromatrix Speed Chucks and Nests for Drill Jigs are made in a jiffy with almost no machining.

Be prepared for the next tough chucking problem. Write at once for Bulletin B5 to get full details.

CERRO DE PASCO CORPORATION

Dept. 10, 40 Wall St., New York 5, N. Y.

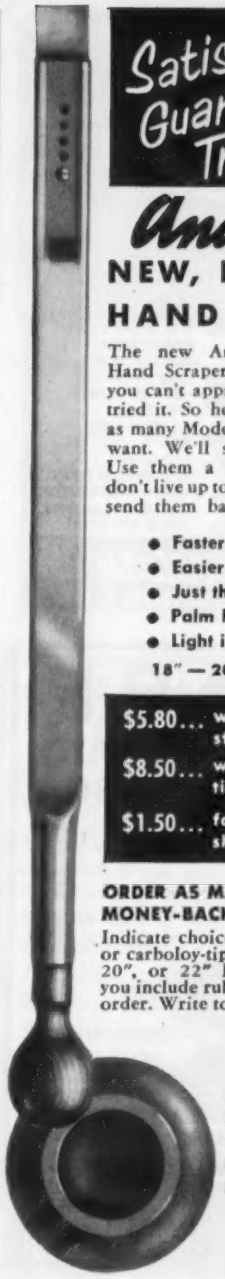
ing No. 1 or No. 2 push button. This causes the bucket to advance to the proper press and, without further attention of the operator, it discharges its load and returns to the mixer.

Different size traveling buckets of many types have been developed for various materials. The track systems on which they operate have been provided with a wide variety of control methods, enabling nearly every conceivable kind of operation from hand-propelled to semi-automatic and completely automatic.

Magnetic Bit Holder and Socket for Screw-Driving and Nut Running

A magnetic bit holder and socket, designed to minimize lost time and motion on screw-driving and nut running operations, is now being produced by The Apex Machine & Tool Co., 1027 S. Patterson Blvd., Dayton 2, Ohio. A permanent magnet in the holder and socket holds the screw or nut firmly in position at all times, expediting work in close quarters and hard-to-reach spots. The magnetic force is said to be great enough to permit working with the tool in a vertical position without dropping the screw or bolt. The bit holder has a bit retaining ring which holds the bit in place and prevents it from pulling out of the holder during operation.

The bit holder is available for use with all popular makes of spiral and power drivers and is also offered in hand driver models. The holder will accommodate a full range of Apex insert bits to drive Phillips, Frearson (Reed & Prince), slotted, clutch head and socket head screws. The magnetic socket is offered in a variety of lengths and broached openings and is designed for use with sheet metal screws, hardened and commercial cap screws, hex head nuts, bolts, pal nuts and other fasteners.



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Anderson

NEW, IMPROVED

HAND SCRAPER

The new Anderson Model 5-D Hand Scraper is the kind of tool you can't appreciate until you have tried it. So here's our offer: Order as many Model 5-D scrapers as you want. We'll send them promptly. Use them a full week . . . if they don't live up to all your expectations, send them back to us for refund.

- Faster Cutting
- Easier to Use
- Just the Right Spring
- Palm Fitting Grip
- Light in Weight

18" — 20" — 22" lengths

$5.80... with high speed steel blades

$8.50... with carboloy-tipped blades

$1.50... for rubber bumper shown below

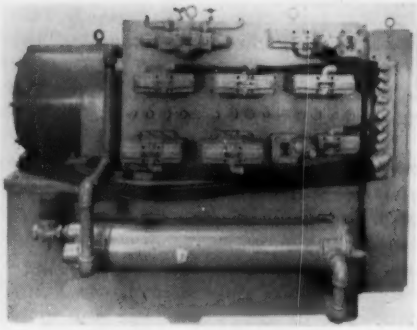
ORDER AS MANY AS YOU NEED
MONEY-BACK GUARANTEE

Indicate choice of high-speed steel or carboloy-tipped blades, and 18", 20", or 22" lengths. We suggest you include rubber bumpers in your order. Write today!

ANDERSON
BROS. MFG. CO.
1907 Kishwaukee St.
ROCKFORD
ILLINOIS

Hydraulic Power Units Are Designed for Operating Pressures from 250 to 2,000 P.S.I

The Control Systems Division of Turchan Follower Machine Co., 8259 Livernois Ave., Detroit 4, Mich., has announced a wide range of hydraulic power units which are available in standard, J.I.C. and custom-built designs for operating pressures from 250 to 2,000 p.s.i. Illustrated herewith is a specially-designed power unit, typical of the many self-contained "package" units now being manufactured. Included are all necessary motors, pumps, controls, valves, piping oil reservoir; also essential hydraulic accessories, such as oil level gages, filters, cleaners, fittings, and so on. The power units are of a compact, simplified design.



Turchan Custom-Built Power Unit

Circular Sawing Machine Cuts Stock up to 43 Inches in Diameter

For cutting off ferrous or non-ferrous material, The Motch & Merryweather Machinery Co., Cleveland 13, Ohio, has announced the Model No. 5 Circular Sawing Machine which is designed to cut stock up to 43 in. in diameter. The saw carriage of the low-speed type machine is mounted on a heavy base at right angles to a heavy

SHARP
NAMEPLATE MARKING
The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this
Model No. 4
NAMEPLATE DETAIL PRESS.
• Simple Operation
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GEO. T. SCHMIDT, INC.
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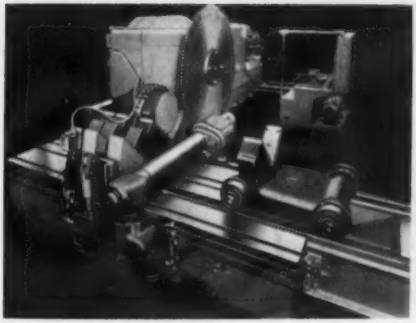
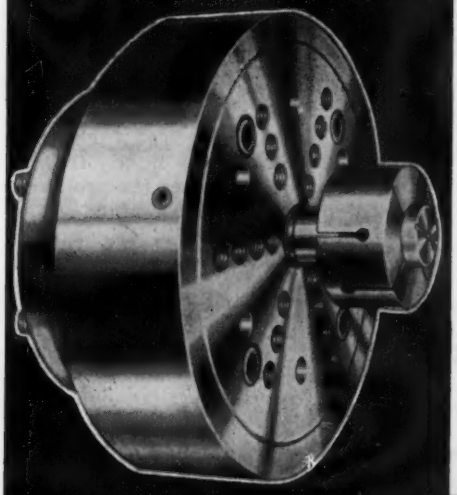
EISLER JIG BORING
CAM MILLING
A SPECIALIZED CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION ...EXPERIMENTAL DEVELOPMENT
EISLER ENGINEERING CO., Inc.
734 So. 13th St. Newark 3, N. J.

T-slotted work supporting table. The single-speed type saw carriage has additional feed variations which are available by means of sheave change or by change gears. The saw head is powered by a 30-h.p. 900-r.p.m. motor connected by multiple belts and sheaves to the gear train. The final spindle drive has large, heavy-duty, herringbone gears. The face of the spindle is 20 in. in diameter, with four pins supplying the mounting and saw blade drive.

Stock to be cut is placed in a V-block at the front of the machine. Clamping is by means of a hydraulic cylinder connected through linkage to a heavy roller chain. Larger diameters are accommodated by removing the jaw sections of the V-blocks. A large elevating roller assists in elevating the stock from the V-block. Power is applied by a gearhead motor. The roller is elevated by two hydraulic cylinders interconnected through the work-holding base. Additional support is provided by a heavy-duty dolly mounted on rails adjacent to the work-holding base. All movements, including the head feed and feed control, are hydraulic, the power being provided by a hydraulic pump driven by a 5-h.p. 1,200-r.p.m. motor. The electrical and hydraulic systems are to J.I.C. standards.



Motch & Merryweather Model No. 5 Circular Sawing Machine



9 Reasons for You to get the Facts on SPEEDGRIP CHUCKS

1. They increase production.
2. They give greater accuracy.
3. Set-up time is shorter.
4. They are safer to operate.
5. First cost is low.
6. Maintenance cost is low.
7. Design is simple.
8. Guaranteed to do the job.
9. Service is prompt.

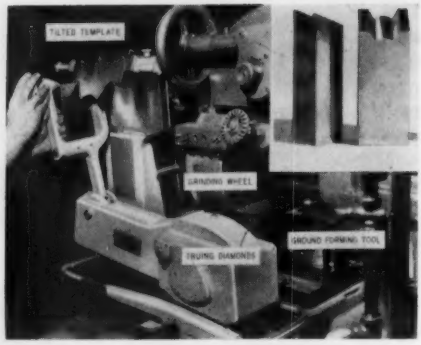
Speedgrip Precision Internal Chucks will save you money on second operation work.

WRITE FOR FREE MANUAL

SPEEDGRIP CHUCK 820 N. WARD STREET ELKHART, INDIANA

Cutter Relief Grinding Simplified with Wheel Forming Attachment

Designated as the Series "R" Diaform, a wheel forming attachment, with relief angle compensator, which is designed to simplify the grinding of relief angles on forming tools has been announced by Pratt & Whitney, Division Niles-Bement-Pond Co., 25 Charter Oak Blvd., West Hartford 1, Conn. The attachment, available in three models, works on the well-known pantograph principle and is said to eliminate the need of distorted templates, projection drawings and lengthy calculations in order to retain the true form of the cutting edge on a forming tool when grinding the required relief.



P & W Series "R" Diaform with Relief Angle Compensator in use. Inset shows finished forming tools.

According to the manufacturer, the operation is simple. The template is mounted on the template carrier, which has graduated scales, and the carrier is tilted to the included angle of both the end relief and top rake. For side relief, the entire carrier is swiveled out to the desired angle. The wheel is form-trued by lightly traversing the tracing bar over the profile of the tilted and swiveled template. The path of the tracer is transmitted through the pantograph mechanism at

Does jobs no drill can do! *up to 10 Times Faster than Boring!*

NEW Clark "HOLE-MAKER"

Totally new—maximum rigidity, no chatter! Roughs or finishes holes to exact size in FORGINGS, CASTINGS, BOILER PLATE, THIN STOCK, TUBING; CROWNED, CYLINDRICAL AND FLAT SURFACES. One of 3 blades is *always* in the cut on odd work shapes—*smooth action even on intermittent cuts!* Use new HOLE-MAKERS in radial drills, drill presses, turret lathes, portable electric or pneumatic drills, etc. Excellent for trepanning and rough boring I.D.'s in Tubing, Castings, etc...a real production tool!

Holes can't drift, spindle can't deflect—it's piloted 2 ways!

Cuts steels, plastics, transite, non ferrous metals, stainless steel, etc!

5 ADJUSTABLE SIZES: Specify Straight Shank or M.T. 2. 3. 4. Other tapers on order

Models:	102	203	304	405	506
Capacity:	1" to 2"	2" to 3"	3" to 4"	4" to 5"	5" to 6"

Order from your dealer or write for catalog!

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.

ON OILY AND GREASY FLOORS
STOP
COSTLY SLIPPING ACCIDENTS

USE Tamms FULLER'S EARTH

Adds greatly to the safety of your shop • Provides safe non-slip footing • Absorbs oil and grease • Lessens fire hazard because, unlike saw dust or wood shavings, it is non-inflammable • Every shop needs this low cost safety aid.

A trial will convince you. Send for FREE SAMPLE.

DEPT. RM-9 TAMMS INDUSTRIES, INC. 228 N. LA SALLE ST., CHICAGO 1, ILL

a 5:1 or 10:1 reduction ratio (depending on the model attachment used) to the truing diamonds, which quickly and accurately form-true the grinding wheel to the "distorted" template form.

Magnetic Adjustable V-Block Provides Accurate Vernier Calibration to 5 Minutes

Made of alternating material with high permeability and low residual magnetism and non-magnetic brass strips, a magnetic adjustable V-block

Anton Magnetic Adjustable V-Block

which is said to provide accurate vernier calibration reading to 5 minutes has been announced by Anton Machine Works, 1226 Flushing Ave., Brooklyn 37, N. Y. A hairline adjustment mechanism allows quick and accurate setting of the vernier scale. The V-block, it is claimed, can be easily removed from the grinder for priority work and then returned with no consequent loss of time in resetting. The unit can also be used as a sine plate and, in production, as a holding fixture for quality work. According to the manufacturer, the laminations, which are held without pins, will not shift.

ACROMARK

Series 9A—
Power Driven

POWER MARKING MACHINES

are the last word for high production, high precision marking. A powerful gear reduction motor does the driving. Clutch operated. Fast, smooth and quiet.

Model 9 AMP—Motor Driven, Pedestal Model Shown.
Write for latest color folder.

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"THE ORIGINAL MARKING SPECIALISTS"

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PRECISION DIAMOND TOOLS

Industrial Diamonds
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Manufacturers of
DIAMOND WHEELS
and Hones of highest quality.
Prompt delivery.
Ask for literature.

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CLIPPER DIAMOND TOOL CO., INC.
21-C W. 46 ST. N Y 36

Compound for Tapping, Threading, Drilling and Reaming

Designated as "Tap Magic," a scientific blend of chemicals which, by breaking down surface tension, stress and metal-to-metal adhesives set up in the course of tapping, threading, drilling and reaming, frees the tool and permits continued rotation and pressure without tool breakage has been developed by Smith Tool & Engineering Co., Division of Smith-Cage, Yucaipa, Calif. According to the manufacturer, the compound affords the cutting of clean threads (inside or outside) and the drilling of clean holes to close tolerances. Although volatile, with evaporation being a measured part of its action, the compound is neither flammable nor explosive. The compound is available in 4 oz. and 1 pint spout top cans.

If Your Problem
CENTERS here
TURN TO RED-E
LATHE
GRINDER
AND BE SURE!
Red-E Precision CENTERS are the answer to all your turning and grinding ACCURACY problems.
Built to take weights up to 200 tons. Speeds to 4000 RPM.
Your ONE Source
for ALL Centers — over 200 models — Standards and Specials for Lathes, Grinding, Milling, Spinning, Turret, Screw Machining, Burnishing and Gear Cutting operations.
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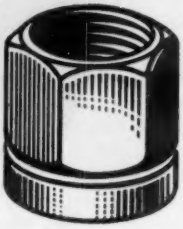
540 Iranistan Ave. • Bridgeport, Conn.

Swivel Shoes and Screws Hold Workpieces

A line of swivel shoes and screws has been announced by West Point Mfg. Co., 26923 W. Seven Mile Rd., Detroit 19, Mich. According to the manufacturer, the fixture parts are unusually effective for holding workpieces without marring or moving. The swivel shoes and screws are available in four types and 63 sizes.



Wespo Swivel Shoe

Flexible Shaft Machine Is Light in Weight

Designated as the Model B38, a lightweight flexible shaft machine which is available with either a ¼ or ⅓-h.p. motor with speeds of either 1,725 or 3,450 r.p.m. is being manufactured by Stow Mfg. Co., 1 Shear St., Binghamton, N. Y. Said to be ideal for grinding, buffing, sanding, wire brushing, polishing and drilling, the machine can be supplied with

Stow Model B38 Flexible Shaft Machine in use

either a 5 or 6-foot flexible shaft and can be used in combination for multiple drilling operations.

Engine Nut Is Designed for Use Where Temperatures Do Not Exceed 550-Deg. F.

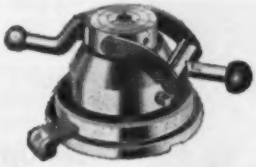
Standard Pressed Steel Co., Jenkintown 22, Pa., has announced the addition of an engine nut to its line of Flexloc self-locking locknuts. Designated as the Flexloc Series 32FE, the engine nut is designed for aircraft or automotive engine use where temperatures do not

Order Zagar Collets and Collet Fixtures at These Low Prices

Zagar has a fixture for every collet tool application. Order NOW from your local tool supplier.

STOCK DELIVERY!

ZAGAR INDEXING FIXTURE



1"—$185
2"—$285

ZAGAR HOLDING FIXTURE

1"—$95 2"—$145

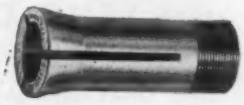
COLLET LATHE CHUCK

1"—$125 2"—$185

AIR-OPERATED FIXTURE

1"—$165 2"—$195

5-C Collet



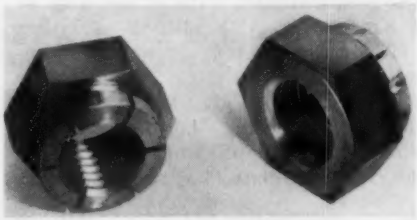
$4.90 W&S No. 2—$6.75

ZAGAR TOOL, INC.

24000 LAKELAND BLVD., CLEVELAND 23, O.

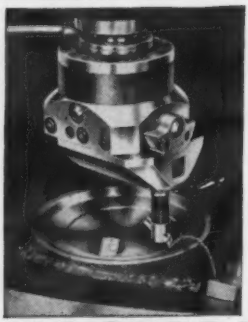
exceed 550-deg. F. Immediate applications are on aircraft reciprocating engines, the cold end of jet engines and compressors. The engine nut is distinguished from the standard Flexloc by an integral metal washer face on the seating side of the nut. According to the manufacturer, the washer face, a circular collar about 1/32 in. thick, can be machined to much closer tolerances than the full seating face of a standard nut.

On the engine nut, squareness of the washer face with the pitch diameter of the nut is said to be held to within 0.005 in. (full indicator reading) on sizes through 7/16 in. and to within 0.006 in. on the ½ in. diameter nut, thus permitting accurate alignment and seating in conformance with aircraft engine specifications.



SFS Flexloc Engine Nuts

The engine nut is available in sizes ranging from 0.190 to 0.500 in. diameter. Firm locking action, even under severe vibration, is said to be provided by the slotted top or locking section which is divided into six equal segments. These segments are closed in to make the inside diameter of the locking collar smaller than the outside diameter of the companion bolt. As the nut is applied, the bolt pushes back the resilient segments and the resultant spring tension holds the locknut securely in place. The nut, it is claimed, can be re-used in this manner over and over again.



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THE BORING AND FACING HEAD THAT THINKS FOR ITSELF

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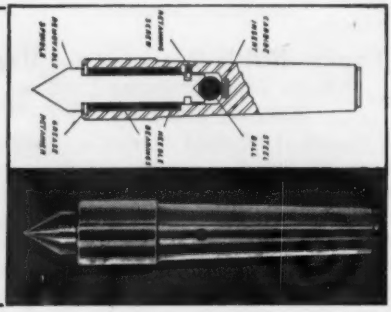
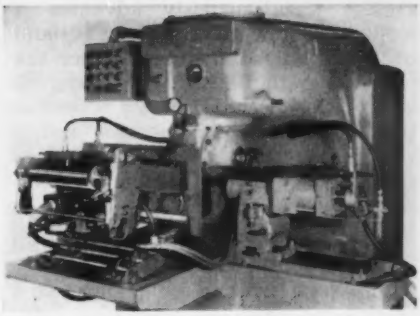


Automatic Loader Handles Long-Shaft Unsymmetrical Gears

A Red Ring Automatic Loader which is designed for handling long-shaft unsymmetrical gears on standard rotary shaving machines has been announced by National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich. The loader has a built-in gaging device, magazine feed, air powered loading fingers and a discharge chute that feeds finish-shaved parts to the unloading position. A specially-designed set of lever-type trip fingers in both the input magazine and the discharge chute keep the gears from touching each other and avoid the cocking of parts that can result from the effect of the greater weight of one end of an unsymmetrical long-shaft gear. The operation of the loader is completely automatic when used in conjunction with a standard machine equipped with suitable controls and an air powered tailstock.



Red Ring Automatic Loader installed on standard rotary gear shaving machine

The gears are placed in the input magazine. An air cylinder then advances a feed slide with one gear toward the cutter, and feed fingers mesh the work gear with the cutter. While the gear is being shaved, the feed slide automatically retracts to loading position where another gear drops into position. When the gear is shaved, the air

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In ANY Pattern . . .
On ANY Drill Press

Drills 2 to 8 holes at one stroke

with a Adjustable MULTI-DRILL model 900

Increase production up to 800% . . . save time, cut costs. MULTI-DRILLS make *any* drill press produce *more*. Attached without alterations or special tools. Quick, easy setups of universally adjustable spindles give you more flexibility . . . wider application. Handles any hole pattern within 9" circle; centers close as ½" Extension Spindles available to increase working area to 22½". Special adaptations available.

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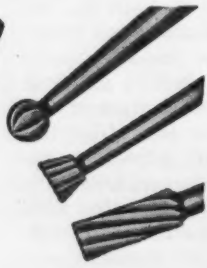
cylinder simultaneously advances a work gear toward the cutter and causes an unloading finger under the shaved gear to place the finish-shaved gear in the discharge chute where it rolls in front of the operator and is removed. Oversized gears are gaged automatically before entering the input magazine by being passed between two mating gears mounted on fixed center distances. Oversize work gears will not pass between the gaging gears.

Vernier Bevel Protractor Has Dull Chrome Finish on Measuring Dial

A universal vernier bevel protractor with "Lustro-Chrome" dull chrome finish over the entire measuring dial has been announced by George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y. The finish is said to eliminate glare, making measurements easy to read, and protect the surface from rust and corrosion. All parts of the tool are made in a sturdy thickness of 0.100 in., preventing deflection and assuring accuracy. Any angle can be measured to 5 minutes by means of the vernier. Regularly equipped with a 6-in. blade, the protractor can be supplied with a 12-in. blade, as well as a stand with a precision lapped base which can be set up on shafts as well as flat surfaces. The instrument is supplied in a wooden case.

Illustration showing make of Universal Vernier Bevel Protractor together with precision lapped base for same

Your Best Buy in Burs!



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Fixture Components

Siewek Tool Co., 2862 E. Grand Blvd., Detroit 2, Mich., has announced the addition of fixture keys, spring plungers, spring stops, torque screws, toggle pads, and swivel screws to its line of drill jigs, fixture clamps, and fixture details. Each item is made of hardened alloy steel and is available

Siewek Fixture Components

in a wide variety of styles and sizes. Full size tracing template sheets of all items can be supplied.

Hydraulic Valve Line Consists of 3,500 Basic Models

A line of hydraulic valves, consisting of more than 3,500 models with many design features, has been announced by the Hydraulic Power Division of The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. Features of the valve line include a full floating operating lever on directional valves to give actual "feel of the control"; O-ring seals on each end of the valve body to assure leakproof operation; full flow design for a minimum of pressure drop through the valve; long lands on both

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Pressure tip slides to work being held.

For many industrial applications, these clamps will take the place of conventional "C" clamps.

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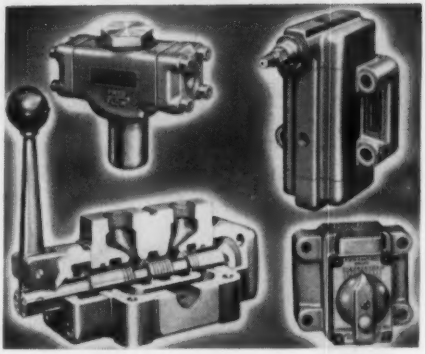
TOOLS

the valve body and spool to prevent binding of the spool; selectively fitted spools; machined inlet and cylinder ports; and interchangeable end caps to permit changing of the valve assembly to reverse valve ports. The line consists of directional and functional valves, each available with optional body styles, types of control, methods of operating and other features for universal application.

Directional values are offered in



Four of the more than 3,500 basic models in the H-P-M Hydraulic Valve line

threaded, flange and gasket-mounted types for maximum pressures up to 3,000 p.s.i. The four and two-way threaded valves range in size from ¼ to 1½ in. for 2,000 p.s.i. service. There is a choice of manual, cam, foot, solenoid, oil and air pilot operation and six spool styles for almost every model. Standard types of control include stem, knob, lever and a quadrant lever locking device which offers special safety features for positive positioning. Functional valves include relief, sequence, unloading, pressure reducing, counterbalance, flow control and check valves. The valves with threaded connections are available in sizes from ¼ to 1½ in. for 2,000 p.s.i., and flanged valves range in size from ½ to 2½ in. for 2,000 and 3,000 lb. per square inch.

Accurate Hole Transfer Made Easy With

NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to ¾" U.S.S. Inexpensive — Last for years.

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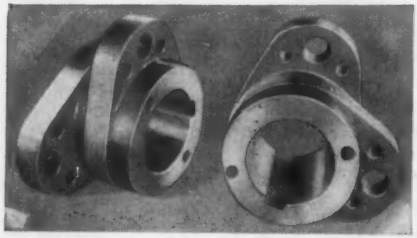

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Need hardened and ground cams?

If you're looking for longer cam life, lower maintenance costs and higher load capacity, let Rowbottom furnish you cams ground after hardening . . . a service recently made available to all cam users. Send specifications or drawings for estimate.

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Also Cam Milling and Grinding Machines for producing cams of all types. Ask for details.

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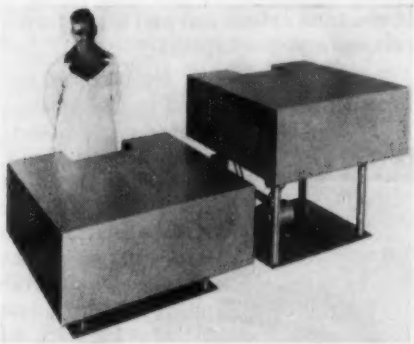
$29.50 to $149.50

Device Maintains Materials At Ideal Machine Feeding Level

Identified as the "Portelvator" Pack Lifter, a device for maintaining materials at constant, predetermined levels



Hamilton "Portelvator" Pack Lifters

for convenient feeding of machines has been developed by The Hamilton Tool Co., 828 S. Ninth St., Hamilton, Ohio. The unit is designed for pit installation. Lift load capacity is 2,200 lb., and rise is 16 in. from the floor level at a speed of 27.5 in. per minute. The machine is operated by means of a ¾-h.p. motor with reversing magnetic starter, push-button controlled, and is equipped with a gear driven limit switch. An 8 x 18-in. operator station is provided on the long side of the 45 x 48-in. table. The apron extends 1 in. below the floor level when the table top is at the maximum height. The power transmission is mechanical, through meshed worm, worm gear and screw, and neither mechanical failure nor power failure, it is claimed, can cause the table to fall or "settle."

The lifter is available in a variety of sizes and with operating features from completely manual to 100 per cent automatic. The unit can be set up to receive floor trucks, thus saving transfer of materials from truck to table, or for operating from "below-the-floor-level" minimum with up to a 120-in. rise.

Rust Prevention Made Easy with Push-Button Dispenser

A time-saving method of rust prevention, utilizing a 12-oz., pressurized, push-button can, has been announced by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. Containing "Rust Veto Spray," the handy dispenser is said to provide a quick, clean and effective way to apply an even, transparent protective film to metal parts, making it especially handy for protecting small items, such as tools, dies, gages, precision parts, hardware and items being stored. According to the manufacturer, simply by pushing the button on top of the can and spraying the parts to be treated, positive anti-rust protection is assured, eliminating messy dipping and dripping.

FOR MOST LATHES TO 1" BAR STOCK CAPACITY . . .

STEP UP PRODUCTION 20% +

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten-day FREE TRIAL to reliable firms)

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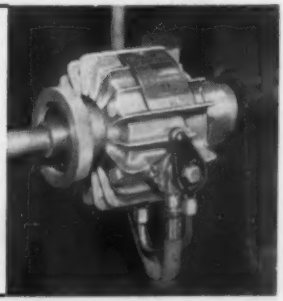
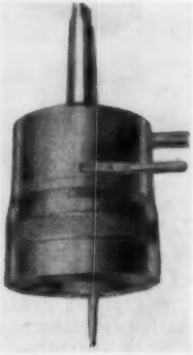


Profiling Head Permits Turning of Internal and External Profiles

Bansbach Machinery Co., 223 N. Cicero Ave., Chicago 44, Ill., is now marketing the Alina Model 30 Profiling Head which is said to permit the turning of both internal and external profiles, provided the forms of such profiles allow the tool bit to be engaged in a continuous cut. Built for heavy-duty operation, the body of the attachment is drop forged and all movable parts are case hardened. The Model 30 can be used in turning square, hexagonal, octagonal and other polynomial profiles. Specific products which can be produced with the head include profile collets; stamping, drawing and forging dies; gages; special tools; and other products. The head can also be used to machine cylindrical and taper forms (stamp and die tapers).

To use the head, a template of the form which is required in the finished product is inserted in the head, the design of which allows for easy interchangeability of these templates. The templates are approximately ¼-in. thick and can be easily made in the shop. One template permits the machining of an unlimited number of pieces, the dimensions of which may vary as much as ¾ in., this being the



Alina Model 30 Profiling Head

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END MILL SHARPENING FIXTURE

• The Weldon Sharpening Fixture quickly resharpens end mills from 1/16" to 2" inclusive. Unnecessary to line up the fixture as it will always grind straight. Designed for any grinder with flat table. No table movement necessary.

Requires little skill to operate. Increases life of end mills and improves their performance. *Write for Circular FA2.*

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

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capacity of the adjusting barrel. Complicated profiles are machined by using progressive templates. The form of the template is transmitted to the workpiece by a roller guide. An ordinary boring tool bit may be used for turning of profiles, thus eliminating the need for special tools. The provision of a micrometer scale on the adjusting barrel is said to assure an accuracy of plus or minus 0.0005 inch. The Alina Model 30 Profiling Head is said to machine profiles with corner radii of less than 0.020 inch.

Chicago-Latrobe Type No. 1407 Harduty Reamer Set

Reamer Features Carbide Tip

Designated as the Type No. 1407 Harduty, a reamer with a carbide tip, having a high speed steel body, taper shank and straight flutes, has been announced by Chicago-Latrobe, 419 W. Ontario St., Chicago 10, Ill. According to the manufacturer, the carbide tool is capable of reaming accurate holes in hardened steel having a Rockwell 40 C scale or higher hardness. Generally used in toolroom applications, the reamer is available in sizes of ¼, 5/16, ⅜, ½, ⅝ and ¾ inch. The tool can also be furnished in sets, consisting of ¼, 5/16, ⅜ and ½-in. sizes, contained in a hinged oak case for protection.

NEW ACCURATE AUTOMATIC

Morrison 1" KEYSEATER

★ AUTOMATIC FEED eliminates pushing a feed bar and insures accuracy.
★ AUTOMATIC STOP cuts off the feed for any given depth.
★ AUTOMATIC RELIEF backs the work away from the cutter eliminating drag and insuring a clean keyseat.
★ AUTOMATIC CENTERING centers up the work quickly and easily.
★ AUTOMATIC LUBRICATION feeds oil to all necessary moving parts.
★ SINGLE TOOTH CUTTERS for accurate clean keyseats and eliminating time and trouble in sharpening.
★ QUICK SET UP is one of the most important features.

Write for descriptive circular.

The D. C. MORRISON Company

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½-Inch Electric Drill Utilizes 6-Ampere Motor

Designated as the Model 516, a heavy-duty ½-in. electric drill which utilizes a 6-ampere motor that develops high chuck twist power has been announced by Porter-Cable Machine Co., 2305 N. Salina St., Syracuse 8, N. Y. The drill is compact and light, weighing 10 lb. and measuring 14¼ in. long x 3½ in. wide x 9⅞ in. high. The rear spade-type handle is adjustable for vertical or horizontal position, or may be removed entirely for working in cramped quarters. An auxiliary two-position handle is said to permit the operator to apply more pressure and maintain accuracy. A trigger switch provides finger-tip control, with a push-button lock for one-hand operation. The drill has a ½-in. gear-type chuck for positive slip-proof grip on bits. Bit capacity is rated at ½ in. for steel and 1⅜ in. in wood. A universal 115-volt a.c.-d.c. motor drives the chuck at 550 r.p.m. The spindle offset is 1⅛ inches. Standard equipment includes gear chuck, key, key holder, auxiliary handle, spade handle and 10-ft. electric cord.

Porter-Cable ½-Inch Heavy-Duty Electric Drill

A special vertical drill stand, identified as the Model 5012, is available to convert the drill into a drill press. The accessory enables the operator to apply steady pressure with precision control. The portable drill can be attached or removed quickly and easily without tools. The

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Sheet Floater

- SAVES TIME
- MONEY
- MANPOWER

The Verson Sheet Floater quickly and economically separates steel sheets and blanks for feeding presses, brakes, shears, etc. It magnetically separates the sheets—causes them to fan out for easy grasping. Feeding is speeded up, danger of cuts and lacerations to workers' hands is reduced, and the possibility of die damage due to feeding more than one piece is minimized. The Sheet Separator can be used for rectangular, round and most odd shaped pieces. It is especially helpful on oily or burred steel that tends to nest when stacked. Two Types in Four Sizes—Write for descriptive bulletin and prices.

A Verson Press for every job from 60 tons up.

Verson

VERSON ALLSTEEL PRESS CO.

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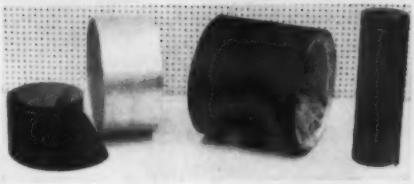
vertical adjustment of the holding bracket is from 0 to 10 in., and it can swing in an arc to any position. The drill stand permits a maximum feed of 5 3/8 in. and a drilling radius of 7 1/8 in. from the center of the column.

Non-Slip Surfacing for Pulley Lagging

Designated as Types E and F, a type of "Safety-Walk" brand waterproof non-slip surfacing with a mineral coating of traprock has been developed especially for pulley lagging by Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn. The surfacing is a thin, tough fabric which is said to be flexible enough to be adapted for use on any type of industrial pulley. It can be spiral-wound or applied in sections. Both types are identical, only the method of application being different. The Type E requires a separate adhesive, while the Type F is manufactured with a pressure sensitive adhesive backing. According to the manufacturer, the nature of traprock coating is such that it avoids any harsh adhesive action on belts or belt lacings; yet, it is aggressive enough to provide the required traction. The non-slip surfacing, which is easily and quickly applied, is fire-retardant and resistant to oil, grease and water. It is available in rolls up to 24 in. wide.



3M Types E and F "Safety-Walk" Non-Slip Surfacing

People work better when they SEE BETTER

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Magni-Focuser helps a worker make adjustments on precision equipment.

MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

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Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

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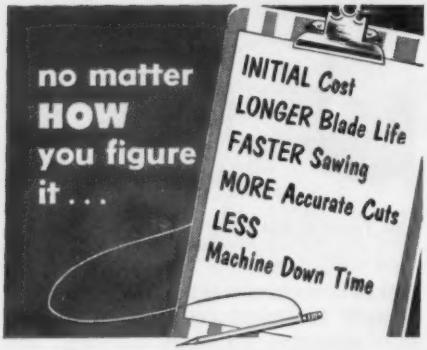

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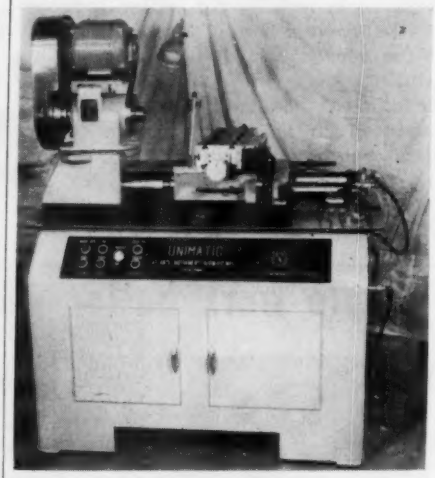
Precision Boring Machine Repeats Operations to 0.0002 Inch

Identified as the "Unimatic," a precision boring machine which is said to guarantee repeatibility to 0.0002 in. under normal working conditions has been announced by Atlantic Instrument Corp., 90 Broadway, Norwood, Mass. According to the manufacturer, the machine features a temperature resistant design which is not affected by normal temperature changes. The boring machine is equipped with a



Atlantic "Unimatic" Precision Boring Machine

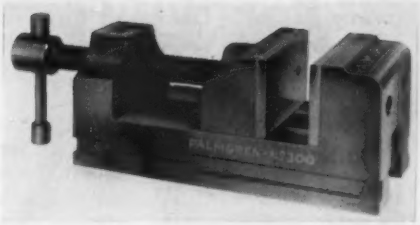
built-in sine bar which permits the accurate boring of tapered holes and standard Bellows air controls which permit variable table feeds. Pneumatic timers permit predetermined settings for dwell and cycling periods for either automatic or manual operation. A black granite surface base, ground and lapped to an accuracy of 0.00005 in., serves as a base for the machine. Precision ground tool steel ways and four guide bushings, it is claimed, support the table in such a manner as to eliminate rocking. Differential ex-

pansion or contraction of the supporting members of the machine is said to be compensated for by a floating support which permits the overall length of the machine to change without affecting the accuracy.

The Unimatic machine is equipped with a Whitnon cartridge-type spindle which uses class 7 Barden ball bearings, which is designed to accommodate a standard 5C Hardinge collet and which is threaded to accommodate a standard Hardinge step chuck. The spindle is designed for speeds up to 4,000 r.p.m. Flange-type cartridge spindles capable of operating up to 10,000 r.p.m. are also available.

Drill Press Vise Opens 3 Inches

Designated as the "Palmgren" No. 300, a drill press vise which has jaws 3 in. wide x 1¾ in. deep and which opens 3 in. has been announced by Chicago Tool & Engineering Co., 8399 S. Chicago Ave., Chicago 17, Ill. The vise utilizes removable steel jaw plates and a heavy Acme thread adjusting screw. Machined slots are provided on either side of the vise to aid in clamping to the machine table. Recommended for use on drill presses, milling machines, grinders and other machines, the vise is machined square on all sides and may be turned on either side, end or upside-down for special operations. The vise is accurately machined of semi-steel grey iron castings.



"Palmgren" No. 300 Drill Press Vise

Columbia

TOOL STEELS for all tools for all purposes

★

HOT WORK-SHOCK RESISTING:

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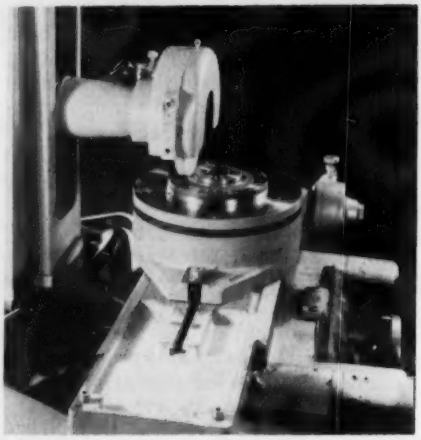
347 W. 107th St., Chicago 28, Ill.

Rotary Table Is Designed for Use on Surface Grinders

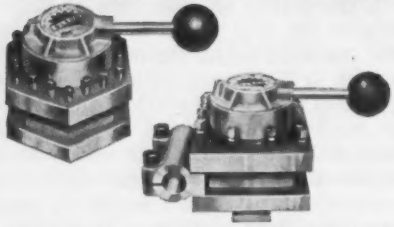
Vulcan Tool Co., Pritz and Highland, Dayton 10, Ohio, has announced a rotary table for surface grinders that utilizes regular air line sources for power and attains variable speeds ranging from 40 to 100 r.p.m. The unit is a portable attachment for the surface grinding of flanged studs or bushings, bearing spacers, forming rolls, convex or concave surfaces, flush pin gages, punches or dies. With the table, only the machine cross feed is used, minimizing error and providing time-saving precision grinding or fine micro finishes on tool or production items. The unit can be used on a sine plate or angle fixture utilizing a standard surface grinder wheel. Precision built throughout, the table can also be used with standard permanent magnetic chucks or simple fixtures to suit the part. The table is available in either a 6 or 10-in. diameter model.



Vulcan Rotary Table in use on surface grinder

In connection with the rotary table, a lapping plate for converting the table into a portable or bench-type lapping machine is also available. By mounting

"WEDGE-LOCK" TURRET



Does not raise up when indexing in all 12 positions. 4-way and 6-way block models. Repetitive accuracy to within .0003 plus or minus within itself.

WRITE FOR FOLDER

Makers of Combination Rotary Tables and Angle Plates. Also Helical Gear Speed Reducers, Single and Double Reduction. Also Special Gears of All Types.

Open territory available to representatives.

OLSON INDUSTRIAL PRODUCTS, INC.
40 W. WATER ST. • WAKEFIELD, MASS

NEW DESIGN

LET'S FACE IT!

★ *A Boring head that won't face is not complete*

Boring, Facing, Turning, Grooving, Undercutting—
All in ONE Toolhead

WRITE FOR DETAILS

CHANDLER TOOL CO., Muncie, Ind.

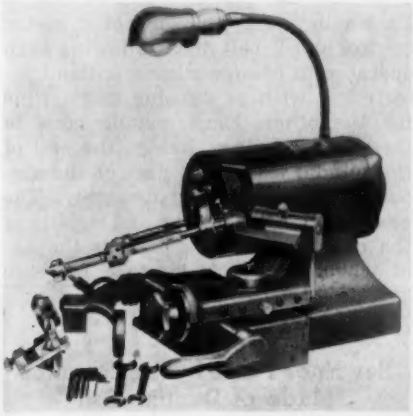
Chandler-Duplex
COMBINED BORING & FACING TOOL HEADS

SIX SIZES

the lapping plate on top of the table, a portable lapping machine is available for use practically anywhere in the toolroom.

Dry-Type Drill Grinder Is Available in Bench and Pedestal Models

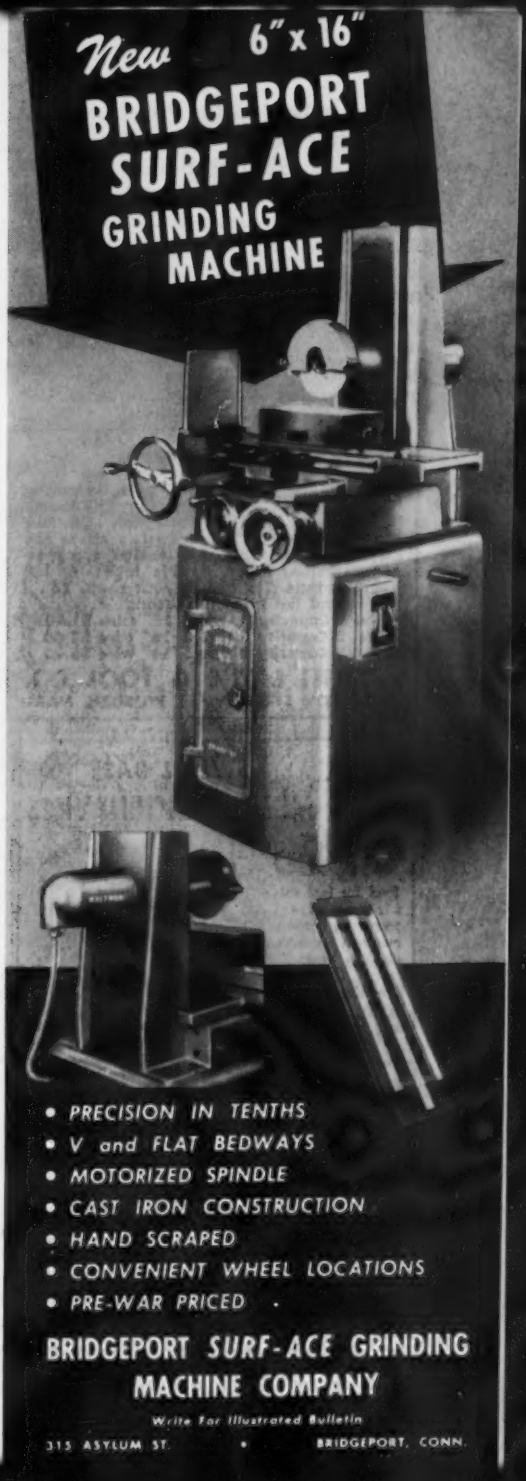
Designated as the "Tool Line," a dry-type drill grinder which is available in both bench and pedestal models has been announced by The Brown-Brock-



Brown-Brockmeyer "Tool Line" Dry-Type Drill Grinder

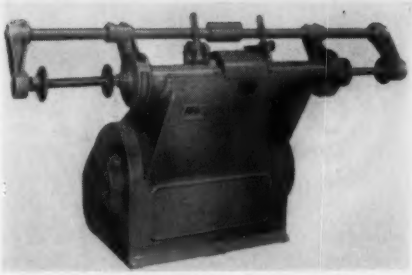
meyer Co., Dayton 1, Ohio. According to the manufacturer, the grinder is a compact, speedy unit designed for quickly restoring dull drills to a uniform, clean cutting point to ensure true and accurate cylindrical holes. The grinder is equipped with a precision micrometer lead screw, with only two settings, for accurately positioning the drill.

The unit, it is claimed, will grind either straight or tapered shank two-lip twist drills and has a drill capacity of from 0.062 to ½-in. diameter to any included angle ranging from 80 to 160 degrees.



Lathe Is Suited for Polishing and Buffing Large and Irregularly Shaped Parts

Designated as the Model RRO, a two-spindle wide-swing polishing and buffing lathe which is said to be especially suited for polishing and buffing large and irregularly shaped parts by hand polishing or in conjunction with semi-automatics has been announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich.



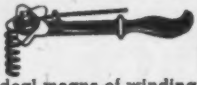
Hammond Model RRO Wide-Swing Polishing and Buffing Lathe

Each spindle has its own motor, motor control and V-belt drive, allowing each operator to change wheels without interfering with or causing down time for the other. Each spindle runs in three ball bearings, one in the end of the spindle which is a part of the special outboard bearing assembly. The heavy-duty construction and rigidity of the outboard bearing permits the use of wheels up to 16-in. face on each spindle.

Bar Knobs and Speed Handles Made of Ductile Iron

To provide long life and easy workability, bar knobs and speed handles made of ductile iron, which is claimed to possess the process advantages of cast iron with many of the physical properties of steel, have been announced by Lodding, Inc., Dept. N 72, 79

A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire $1.50
No. 2 Capacity 0 thru 3/16" wire $3.00
No. 3 Capacity 0 thru 5/16" wire $5.00

HJORTH LATHE & TOOL CO.
10 BEACON STREET WOBURN, MASS.

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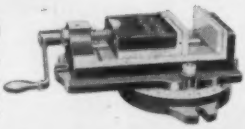
SWIVEL BASE
MILLING MACHINE VISES
As low as
$24.00
Send for free catalog on vises, power hack saws, magnetic chucks, dividing heads.



L-W CHUCK COMPANY
28 SO. ST. CLAIR STREET TOLEDO 4, OHIO

TAP MAGIC

STOPS TAP BREAKAGE
Cuts clean threads — acts instantaneously!
Frees stuck taps and reamers right now!
Speeds tapping — not a cutting oil!

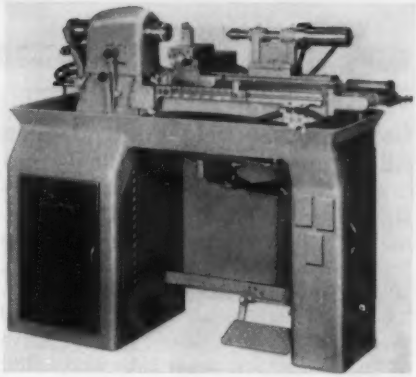
Dealers and jobbers:
Some territories still available. Write:

SMITH TOOL & ENGINEERING CO.
A DIVISION OF SMITH-CAGE • YUCAIPA, CALIFORNIA

Beacon St., Worcester 1, Mass. According to the manufacturer, ductile iron is strong, tough, elastic, weldable, hardenable and resistant to shock, wear, fatigue and heat.

Production Lathe Features Rigid Construction

Elgin Tool Works, Inc., Dept. II, 1771 Berteau Ave., Chicago 13, Ill., has announced a high production air feed lathe which is said to afford high precision, efficiency, simple operation and rigid construction. The carriage is pneumatically-hydraulically powered in an automatic cycle for maximum productivity and accuracy. The headstock spindle is of the preloaded ball bearing type, capable of speeds up to 4,000 r.p.m. Either a draw-in collet with a 1-in. capacity or a stationary collet with a $\frac{13}{16}$-in. capacity can be supplied. The machine is powered by a $\frac{3}{4}$-$\frac{3}{5}$-h.p. motor through a clutch brake drive, the latter being wired into the carriage cycle to stop and start the spindle for part changes. The machine has a swing of 11 in., a carriage travel of 13 in. and automatic tool relief.



Elgin High Production Air Feed Lathe

CUT QUOTES
UP TO 30%
ON PRODUCTION TURNING AND GRINDING OPERATIONS
FOR HIGHER PRODUCTION
- Eliminates Driving Dog
- Whole length of workpiece can be machined in one pass
- Machine need not be stopped between workpieces
- Workpiece end need not be square or flat

Available from stock in Morse Tapers 2 to 6 for 9/16" diam. and up.

Our New DRIVING CENTER (Pat. Applied for)

is revolutionizing any work done between centers by replacing the driving dog with a driver on the end of the workpiece. Thus, the hazard, fatigue, whip, bow, and vibration caused by driving dogs are eliminated, and the work quality is greatly raised.

Write

ZEE-HAWK
MACHINE SPECIALTIES, INC.
3716-20 W. MONTROSE AVE.
CHICAGO 18 ILLINOIS

TOOL ENGINEERS and TOOL MAKERS

HERE IS A NEW TOOL TO STUDY. HIGHEST STANDARD OF EFFICIENCY AND ACCURACY UNRIVALLED IN PRICE AND VALUE

It's the NEW MICRO LOCK
QUICK CAMLOCK + MICRO FINE ADJUSTMENT COMBINED

made by the FAMOUS MAUSER

SPECIFICATIONS
Total Length: 9" - Measuring Capacity: 6" - Graduations: 1/1000" & 1/128" - Code Word: GINDO

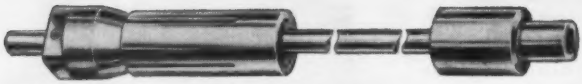
Without detachable Height Gauge Base and Scriber ... $25.50

Same as above but with detachable Base and Scriber - Code GINFU ... $33.50

SOLD ON A 10-DAY MONEY BACK GUARANTEE

Send for Folder - Code GINRE

GEORGE SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS
200 MM LAFAYETTE ST. • N.Y. 12, N.Y.



Knapp Universal Collet Stop

Collet Stop Is Designed for Use On All Manual and Automatic Lathes

A universal collet stop which is designed for use on all manual and automatic lathes, regardless of size, has been announced by Knapp Industries, 107 N. Franklin St., Syracuse 2, N. Y. The stop is said to accommodate workpieces within 5 in. of the entire length of the headstock draw tube and collet combined. According to the manufacturer, the expanding collet, located in the draw tube, provides a positive and immovable lock.

To install the collet stop, the workpiece is placed in the desired position in the lathe collet, and the collet is closed. Next, the stop is inserted and locked. The connecting link of the stop is then pushed forward until it contacts the workpiece, after which the set screw is tightened. If the workpiece is not long enough to extend beyond the ground size portion of the lathe collet, the adapter must be 0.025 in. or more smaller than the workpiece to permit proper closing of the lathe collet.

Cylinder Features Unusually Large Capacity-to-Size Ratio

The Hanna 750 Series Fluid Power Cylinder featuring an unusually large capacity-to-size ratio has been introduced by Hanna Engineering Works, 1758 Elston Ave., Chicago 22, Ill. According to the manufacturer, the 750 Series cylinder is designed to provide a compact cylinder of large capacity

PART FEEDER

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order.

Single & Multiple Spindle Magazine Feed Power Screw Driving Machines

For driving screws faster in products assembled with screws. These machines operate easily and require very little attention or adjustment when put in production.

Send sample parts when writing for quotation.

COOK & CHICK CO.

638 S. MILLER ST. CHICAGO 7, ILL.

CAMS and TOOLS

for *ALL* Makes

of Swiss Type Automatics

Tooled complete or to your design.

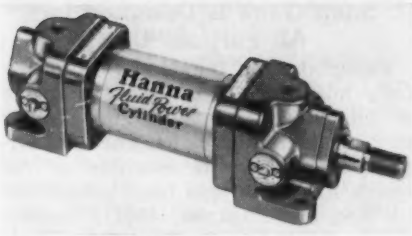
We offer the most efficiently designed tooling and comprehensive layouts obtainable.

Complete proposals will be furnished quickly upon receipt of part prints.

DETROIT CAM & TOOL CO.

2305 GOODRICH AVE.

FERNDALE 20, MICHIGAN



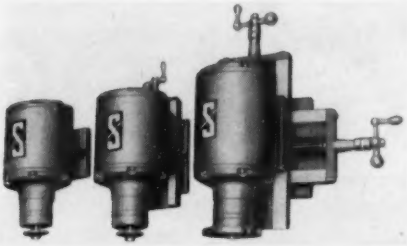
Hanna 750 Series Fluid Power Cylinder

with virtually unlimited application; incorporates a cushion design with positive, easy adjustment; reduces friction to a minimum consistent with positive sealing; is corrosion resistant throughout; and conforms to J.I.C. standards.

Motorized Spindles and Vertical Spindle Grinders

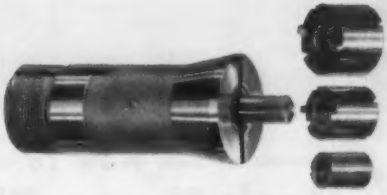
The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, has redesigned its line of motorized spindles and vertical spindle grinders. Illustrated herewith are three models, one with flat mounting pad only (left), one with vertical hand feed parallel to the spindle (center) and one with vertical and horizontal feeds (right). The feeds are available with crank handle or handwheel and with a micrometer dial having a graduated swivel either on the motor mounting as related to the feeds or for swiveling the entire

Standard Motorized Spindles and Vertical Spindle Grinders



New

"HOLE-TRUE" COLLET ARBOR



PRECISION TURNING CONCENTRIC TO BORE
FOR PRODUCTION OR TOOLROOM
ADVANTAGES:

1. SET UP TIME—Connects to drawbar exactly as a collet. No additional parts needed.

2. Shoulder distances held precisely even though bores vary. Work does not change position as arbor expands or contracts.

3. Use on TURRET LATHES, engine lathes, millers, grinders, or any collet device.

4. SAVES LOADING TIME—NO STOPPING WITH PRODUCTION COLLET ATTACHMENT — thus increasing Production up to 300% over ordinary STOP—LOAD and START METHODS.

Available in sets consisting of Master Collet Arbor and 3 adapters to hold in 3/8", 1/2", 3/4" and 1" bores.

Current Production to fit in place of 5C collet only.

WRITE FOR CIRCULAR AND PRICE

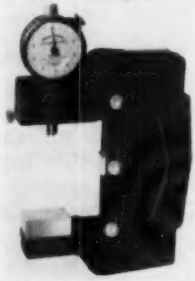
THE MEDELTON CO., INC.
335 East 142nd St., Bronx 54, N. Y.

assembly. According to the manufacturer, the design of the units permits mounting in any position. One feature of the new design is the optional use of wheels which can be clamped between wheel flanges or a backing plate for accommodating Type 2 cylinder type of plate mounted cup grinding wheels.

The motorized spindles and vertical spindle grinders are available in sizes ranging from ½ to 25 horsepower.

Snap Gage Is Designed for All Purpose Use

Designated as the Model B-1200, a fully adjustable indicating snap gage which has a capacity ranging from 0 to 3 in. and which is designed for all-purpose use at the machine or for bench inspection has been announced by Reliant Industries, 4947 Firestone Blvd., South Gate, Calif. The gage utilizes a 0.0005-in. dial indicator. The gaging frame is of light, rugged construction, and the vertical sliding adjustment on the bar is said to be quick, with positive locking.



Reliant Model B-1200 Fully-Adjustable Indicating Snap Gage

Gaging contact buttons and anvils, it is claimed, permit positive gaging, although the indicator does not come in contact with the part being gaged. Gaging contacts are quickly removable and replaceable with other types for varied gaging requirements.

How To
Mark Name Plates In
1/5 the Time

Cutting costs in these times is a good trick if you can do it. You can, on plates requiring detail marking, by using an Automark Electric Metal-Marking Typewriter. The operator lightly touches the key and the Automark does the rest, quickly and automatically. No dial to turn—no lever to pull. Marking output is increased five times and worker fatigue is greatly reduced. Write today for Bulletin 8-16.

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Electric Metal-Marking
TYPEWRITER
Manufactured Exclusively By
DEFIANCE MACHINE & TOOL COMPANY
1924 South Vandeventer Ave. • St. Louis 10, Mo.

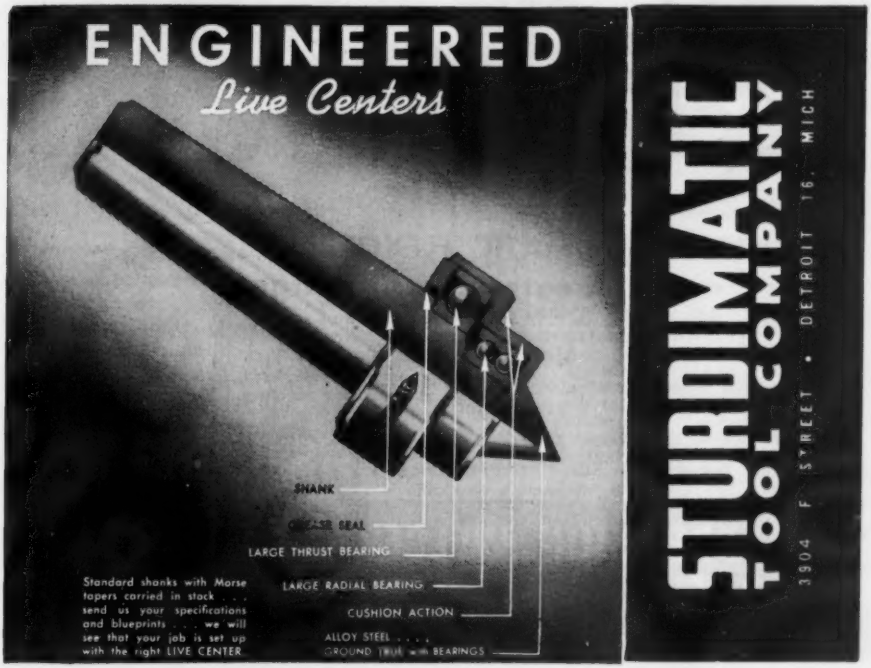
AGENTS
Desirable territories open for responsible representatives. Write giving complete information, lines carried and territory covered.

Unit Serves As Portable Elevator and Truck

Identified as the "Jet-Lift," a heavy-duty, hand-operated, combination portable elevator and truck which employs a three-speed hydraulic jack operated in conjunction with two pumps connected to the pull handle has been announced by The Jetrow Co., 8407 Clinton Rd., Cleveland 9, Ohio. Each stroke of the handle raises the table top 1-11/16 in. to any desired height from 9 to 53 in. off the floor when both pumps are engaged. Finger-tip release is said to permit infinite table positioning within the height range. The unit serves as a truck in the down position and has no uprights to make it top heavy. Said to be ideal for loading and unloading trucks, transporting palletized material, moving dies from storage racks and presses, and so on, the unit enables one man to lift and move 2,000 lb. or more with complete safety. A foot-operated brake prevents the unit from moving during loading and unloading.

Jetrow "Jet-Lift" Combination Portable Elevator and Truck

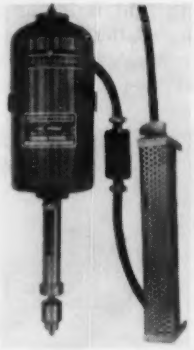
The combination elevator and truck is also available with a crane that can be attached quickly and easily. The


ENGINEERED
Live Centers
SHANK
GREASE SEAL
LARGE THRUST BEARING
LARGE RADIAL BEARING
CUSHION ACTION
ALLOY STEEL . . . .
GROUND TRUE with BEARINGS
Standard shanks with Morse tapers carried in stock . . . send us your specifications and blueprints . . . we will see that your job is set up with the right LIVE CENTER
STURDIMATIC TOOL COMPANY
3904 F STREET • DETROIT 16, MICH

crane is a hand-driven worm gear hoist which permits all-purpose lifting. For feeding bundles of small sheets to a press, shear or brake from a convenient working height, a foot controlled attachment, designated as the "Air-Lift" can be supplied.

High Speed Drilling Spindle Features Self-Contained Motor

The Electro-Mechano Co., 265 E. Erie St., Milwaukee 2, Wis., has announced a high speed drilling spindle complete with a self-contained motor for use in special drilling, reaming and grinding machines. Speed ranges of from 1,000 to 10,000 r.p.m. or 2,500 to 15,000 r.p.m. are available. An electric governor is said to keep the spindle speed constant, whether the unit is idling or drilling. Incorporating its own feed mechanism, the unit should be mounted in a split boss which clamps the lower quill. Chuck capacity is 5/32 in., and chuck runout is 0.001 inch. The motor diameter is 3⅜ in., and the quill extension to the end of the chuck is 5 inches.



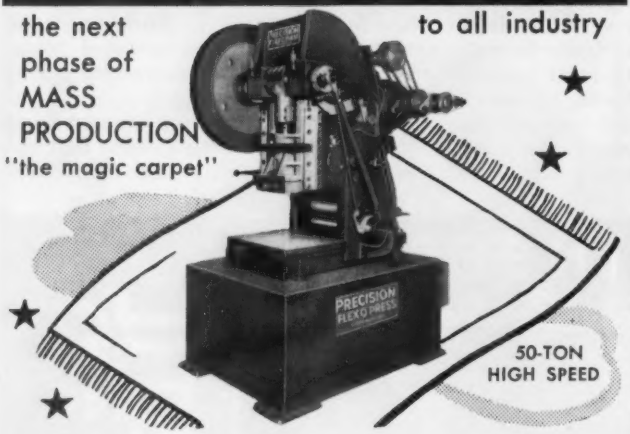
Electro-Mechano High Speed Drilling Spindle

Designed for operation on 115-volt a.c. single phase or 230-volt a.c. single phase, the unit can be mounted in any position. The metal cage with the unit has a 4-ft. cord and should be mounted away from chips and coolant.

automation is a challenge

the next phase of MASS PRODUCTION "the magic carpet"

to all industry



PRECISION AUTOMATIC FLEXOPRESS meets the challenge

Automation is revolutionizing the country. PRECISION automatic FLEXOPRESS is accelerating productivity with its 350 to 600 strokes per minute and automatic feeding —a new high for industry at the "flick-of-a-switch." Don't waste valuable man-power—be one of the endless chain of pioneer industrial names using Precision Automatic Flexopress.

A job once performed by a series of presses is now replaced by ONE Precision automatic Flexopress. This automatic operation presents both a challenge and marketing opportunity for your industrial progress—a new horizon of high standards, far beyond the view of even the most optimistic eye.

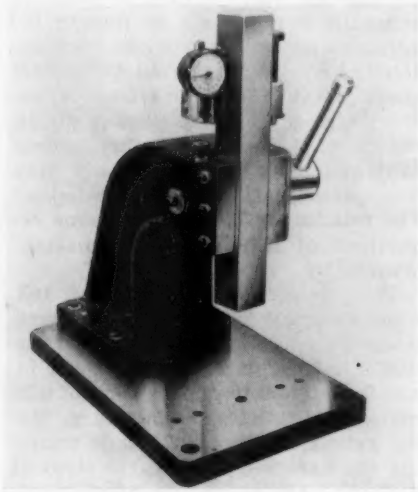
Complete Information Available

PRECISION WELDER & FLEXOPRESS CORP.

138 E. McMICKEN AVE. CINCINNATI 10, OHIO

Press Is Designed for Precision Operations

Designated as the "Micro," a press for precision assembling, piercing, broaching, forming, press fitting and burnishing operations that require perfect alignment and controlled depth has been announced by Queens Tool Engineering & Mfg. Co., 15 Front St., Rockville Centre, Long Island, N. Y. The frame of the press is made of fine grain seasoned cast iron, and the bottom of the frame and the ways for the ram are scraped after machining for accuracy.



Queens "Micro" Press

The base is made of stress-relieved machine steel, precision ground on the top surface. The ram and gear rack are of one-piece construction, and the ram is pack hardened and precision ground in line with a 0.500-in. locating hole in the end of the ram. The pinion, made of machine steel, is of two-piece construction, the large end (handle side) having a close running fit in a bronze bushing pressed into the frame.

PRECISION

16"

DRILL PRESS

150 to 4000 R.P.M.

INSTANT SPEED SELECTION

For drilling, reaming, spot-facing, counterboring and tapping. Variable speed spindle with built-in back gears, driven by a ½ HP single or three phase built-in motor. Completely enclosed drill head design; no belt changing required.

FEATURES . . . Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart; quick-set vernier depth control; sealed-for-life ball bearings throughout; counterbalanced head on bench model; tilting table and ground base on floor model; No. 2 Morse taper or Jacobs No. 2A taper spindle.

Model 602—600 to 4000 RPM, complete with motor and worklight $290.00 and up.

Write for free literature.

The ELECTRO-MECHANO Co.

265 E. Erie St. Milwaukee 2, Wis.

The stop of the press is chrome plated and accurately machined. Half of the stop engages in one tooth of the gear rack for positive lock and is quickly placed in any position of the ram by means of a clamping screw. On one side of the stop is a fine-thread quick-adjusting screw with a lock nut bearing against a hardened stop plug in the frame. On the other end of the stop is a dial indicator graduated in 0.001-in. increments and bearing against a fine thread adjustable stop screw. The press has a 4⅞-in. depth of throat from the center of the ram, and the distance of the ram to the base ranges from 1¾ to 7 inches.

Pocket Comparator Measures Unusually Small Dimensions

Identified as the "Pee Gee," a pocket comparator which is used to measure unusually small parts or minute dimensions on large parts has been announced by National Tool Co., 11200 Madison Ave., Cleveland 2, Ohio. Measurements are accomplished through the use of a powerful magnifying lens (approximately 6 power) and tiny transparent patterns called "reticles." The reticles are actually extreme reductions of large, precise "master" layouts.

The "Scales" reticle, number 103, which comes with the instrument, is used to measure dimensions from 0.0025 to 0.500 in. in steps of 0.0025 in. and from 0 to 0.10 mm. in steps of 0.20 mm. Other reticles available are "Radii" reticle, number 102, for determining radii from 1/16 to 3/8 in. in steps of 1/32 in.; "Angles" reticle, number 104, a protractor showing angles from 0 to 90 degrees with 5-degree increments; "Threads" reticle, number 105, for measuring number of threads per inch;

BREMIL
The IMPROVED Compound Lever Shears
ALL ALLOY FULLY GUARANTEED
Two Sizes
PORTABLE
No. 1 cuts up to No. 11 gauge strip or sheet
No. 2 cuts up to ¼" steel plate.
BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

HAND TAPPING with MACHINE PRECISION
Adapts for LATHE USE
59.50 F.O.B. FACTORY

Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size (18" x 8" x 14". Included 9 adaptors (8-32 to ¾"). Taps not furnished. Branch Mfg. Co., North Branch, Minn. *Write for pamphlet on tap guides, chucks and autostops.*

Dahlstrom TAP GUIDE

CUT TOOL COSTS
broken tools made like new again with NU-TANGS*
Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6) Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.
NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!
Send them to us like this!
GUARANTEED STRONG AS NEW!
We return them like this!
* Patent No. 2,547,003
NU-TANGS INC. 1339 Bates Avenue Cincinnati 25, Ohio

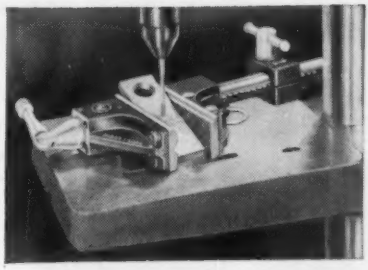
"Thickness" reticle, number 108, with solid and split line scales for measuring thicknesses from 0.002 to 0.016 in. in steps of 0.001 in.; "Diameters" reticle, number 109, which has circle scales for measuring diameters of 0.005, 0.010, 0.020, 0.030, 0.040, 0.050, 0.100 and 1/64 to $\frac{1}{16}$ in. in steps of 1/64 in.; and "Dimensions" reticle, number 116, which is designed for making linear measurements from 0 to $\frac{1}{2}$ in. in steps of 1/64 inch.

The body of the comparator is made

(A) National "Pee Gee" Pocket Comparator. (B) "Pee Gee" Pocket Comparator with instruction booklet and dust-tight plastic container. (C) "Scales" Reticle, number 103, and six extra reticles for measuring radii, angles, threads, thickness, diameters and dimensions in permanent plastic case.

of clear molded Lucite, $\frac{1}{8}$-in. thick. The adjustable lens barrel and reticle retainer ring are of machined aluminum with a black anodized protective finish. The comparator can be focused instantly by sliding the eyepiece further in or out of its body. Fine adjustment is accomplished through a built-in screw arrangement. A stainless steel spring, near the top of the body, holds a steel ball which keeps the instrument in adjustment.

Twin Time and Money Savers!



WAHLSTROM Instant-Change CHUCK saves up to 95% of tool-change time! Spindle never stops. Requires no keys, collets or wrenches. Self-centering jaws automatically grip without slip, do not chew up drill shanks. No other chuck like it!

FLOAT-LOCK SAFETY VISE instantly grips or releases work of almost any shape for SAFE drilling in any position. Prevents accidents and minimizes drill breakage. Also serves as base for low-cost jig. Comes with 9" or 12" jaw openings. Also model for band saws.

Ask your distributor for a demonstration or write us for folder W-50.

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Room 21, 261 Madison Ave., New York 16, N. Y.

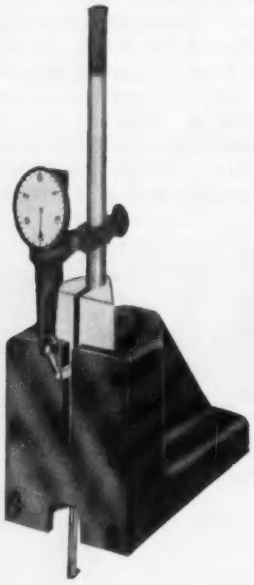
Another AMF Product

WAHLSTROM Chucks
Float-LOCK Vises

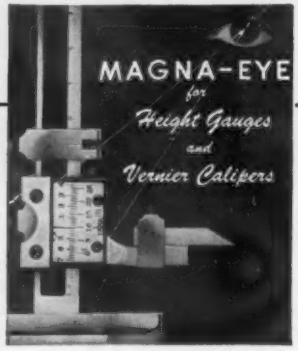
New York 16, N. Y.

Instrument Checks Sidewalls of Dies for Squareness and Imperfections

Designated as the TTCO, a die checker which, with the use of a standard dial indicator, will quickly check the side walls of dies for squareness and imperfections has been introduced by Tietzmann Tool Corp., Englewood, Ohio. The instrument can also be used to check squareness for the general run of tool and diemaking operations. The die checker is made of tool steel, hardened, ground and lapped to a tolerance of 0.0002 inch. The unit has a base with permanent magnetic inserts to help keep it in position when in use. Attachments for holding small dial-type indicators, such as Last Word, Federal, Gem, Micro-Master and Verdict, are also furnished.



TTCO Die Checker



MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" and 60" Calipers.

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Diamond Abrasive Wheel Performs A Variety of Grinding Operations

Identified as "Chip-A-Lap," a diamond abrasive wheel which is designed

A. I. T. "Chip-A-Lap" Diamond Abrasive Wheel

to perform a variety of grinding operations and which is available in a 4 and 6-in. diameter size has been announced by A. I. T. Diamond Tool Co., 646 W. Lake St., Chicago 6, Ill. The wheel can be furnished in two types; namely, "Al-Aloid" bond for wet grinding and resin bond for dry grinding. The Al-Aloid wheel, it is claimed, permits plunge grinding, shaping, hogging and radiusing to be performed on one machine using only one wheel. According to the manufacturer, a grinder, when using the Al-Aloid wheel, can plunge grind with a 150 grit on the o.d. section of the wheel and radius with a 220 grit on the face section of the wheel, or with any grit which is required for finish by the user. The grinder bed is merely raised or lowered for various operations. A water-base coolant must be used.

The resin bond wheel is designed for shaping and radiusing on the face section and surface grinding and chip

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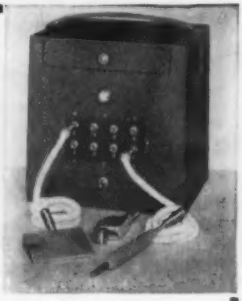

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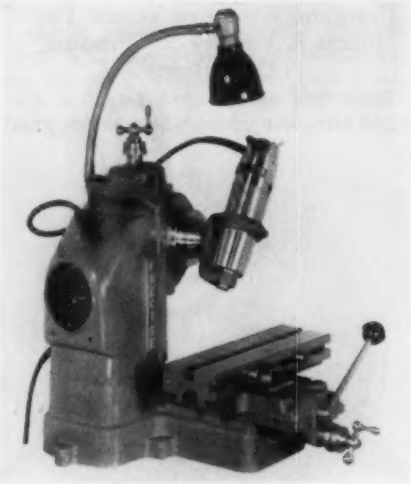
COMET Tool Co.

738-MM BROADWAY • NEW YORK 3, N. Y.

breaking on the o.d. section. This type of wheel is for dry grinding operations only. With either type wheel, diamond grits and hole sizes are made to user specifications.

High Speed Bench Mill Machines Small Parts to Close Tolerances

A high r.p.m. bench mill which is said to provide the necessary speed, accuracy and power needed to machine small parts made of steel, brass, aluminum and plastics to tolerances of 0.0001 in. has been announced by Precise Products Corp., 1345 Clark St., Racine, Wis. Made from close grained semi-steel castings, precision machined and fitted, the machine utilizes a head which may be adjusted from the horizontal position through 60 degrees in either direction. The head is of a heavy, rigid design with wide dovetail slides and an adjustable gib that prevents deflection and chatter. The head has a 3¼-in. travel through a micrometer feed screw. Ac-



Precise High R.P.M. Bench Mill

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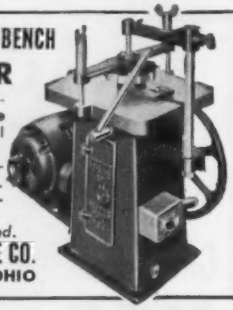

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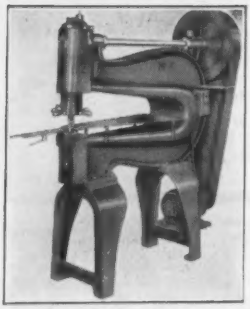

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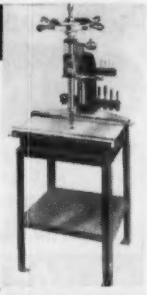

cording to the manufacturer, a Precise "Super 50" is the heart of the machine, supporting an accurate, rigid quill and collet chuck on four precision, grease sealed bearings. A built-in electric speed control with a large calibrated control knob is said to allow continuous quill speed adjustment from 10,000 to 45,000 r.p.m.

The table has a working surface measuring 4 in. wide x 12 in. long and is fitted with a standard ½-in. T-slot and long dovetail slides with an adjustable gib. The table has a 5-in. longitudinal travel through a hand lever. The saddle moves on wide adjustable gibs and has a 3-in. travel through a hand lever. A micrometer feed screw for both the table and saddle can be supplied as extra equipment. All travels are controlled by easily adjusted positive stops to assure accurate duplication of operation. An adjustable work light is furnished as standard.

Hand Operated Broaching Machine Can Be Quickly Set Up

Designated as the Model VH-215, a vertical, hand operated, hydraulic broaching machine which can be quickly set up and put into operation for a single broaching job, or a limited number of pieces, to eliminate bottlenecks which might necessitate sending work out or waiting for a production job to clear large machines has been announced by Pioneer Broach Co., 6434 E. Telegraph Rd., Los Angeles 22, Calif. According to the manufacturer, the machine can cut keyways or square, oblong, hexagon, irregular, splined or round holes. Up to 2 tons of hydraulic pulling power is developed by actuating the hand lever of the machine. Releasing of the hydraulic pressure by turning a knob is said to provide rapid return of the broach to the starting position. A stroke of 15 in. of broach travel, it is claimed, af-

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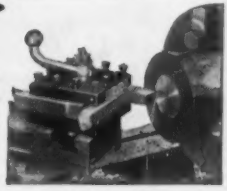
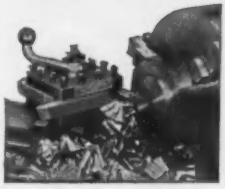
SAVE VALUABLE SETUP TIME

The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

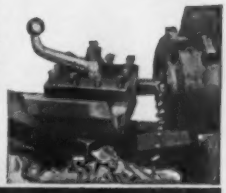
¾" square tool bit mounted in Model 4½-S turret used for facing cut.



Same tool used for broadface turning merely by indexing turret one position or 30°.



Same tool used for inside chamfer merely by indexing back two positions or 60°.



✔12-position indexing.
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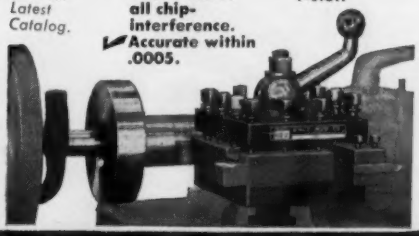

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fords a wide range of capacity for single pass broaching operations. Each stroke of the hand lever results in ½ in. of broach travel, with hydraulic cutting pressure being maintained at all times.

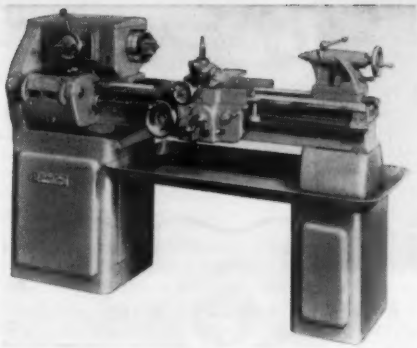
The work table of the machine is said to be ample to accommodate large workpieces. The table measures 16½ x 16½ in., and the machine requires an 18 x 18-in. floor base area. The machine is 42 in. high and weighs ap-

Pioneer Hand Operated Hydraulic Broaching Machine in use

shapes for use on the machine or any proximately 250 lb. Stock accessories and broaches in a variety of sizes and other standard broaching machine are available.

Geared Head Lathe Is Rigidly Built

Sheldon Machine Co., Inc., 4250 N. Knox Ave., Chicago 41, Ill., has announced the Sebastian 13-Inch Geared Head Lathe which is said to be rigidly built and which combines rugged power with unusual accuracy. The lathe



Sebastian 13-Inch Geared Head Lathe

features a large 1⅜-in. hole through the spindle and a multiple-splined spindle that is thick walled, hardened and ground. The spindle is supported by precision tapered roller bearings for long life, and the long tapered key drive spindle nose is standard equipment. The machine incorporates an automatic oiling system, cam action tailstock clamp and easy-shifting spindle speed dial. All gears in the headstock run in oil, are extra wide and are designed for quiet, efficient operation. The enclosed gearbox is large and has 60 different pitches and feeds. A lead screw reverse lever is incorporated in the gearbox, easily accessible to the operator.

The cam action tailstock clamp permits rapid shifting of the tailstock. The carriage has an unusually large bearing surface, and a built-in one-shot oiling system provides lubrication for all bearing surfaces. Two friction disc-type clutches in the apron provide power longitudinal and power cross feed. The clutches can be engaged individually or simultaneously. The bed is a rugged, heavy, one-piece casting with extra large bearing surfaces on the ways. A cabinet in the pedestal provides a convenient storage space for tools and accessories.

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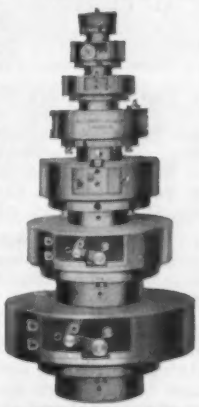

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new literature

1. Universal Oscillating Grinder. The Gear Grinding Machine Co., 3901 Christopher, Detroit 11, Mich., has released a catalog describing the Geargrind Universal Oscillating Grinder for finishing spherical, conical and cylindrical surfaces.

2. Air Chucks designed to give maximum gripping pressure are described in a bulletin issued by The Whiton Machine Co., New London, Connecticut.

3. Tap Cartridges, designed to simplify blind hole tapping, which are custom made in types, diameters and lengths for every tapping operation are described and illustrated in a catalog published by the Tap-Cartridge Co., 10167 Springfield Pike, Cincinnati 15, Ohio.

4. Production Feeding Equipment for punch presses is described in a bulletin released by The Wittek Mfg. Co., 4322 W. 24th Place, Chicago 23, Illinois.

5. Profile Grinder. Rice Pump & Machine Co., Belgium, Wis., has issued a catalog describing and illustrating a machine for the high speed precision grinding of external and internal contours and curved, odd and irregular shapes.

6. Hand-Detachable Counterbores. Continental Tool Works Division of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., has published a booklet describing its line of standard hand-detachable counterbores.

7. Wheel Forming Attachment. Pratt & Whitney, Division Niles-Bement-Pond Co., 25 Charter Oak Blvd., West Hartford 1, Conn., has released a bulletin describing the Models No. 2A and 2B "Diaform" Wheel Forming Attachment.

8. Transfer Screws for aiding in definnitely locating the die in proper relation to the punch on commercial die sets are described and illustrated in a folder released by Heimann Mfg. Co., Urbana, Ohio.

9. Shank-Type Woodruff Keyseat Cutters made of high speed tool steel are described in a catalog published by Quality Tool Works, 792 S. Market St., Waukegan, Ill. Specifications are included.

10. Broach Sharpening Machines for round and flat broaches and universal broach sharpening are covered in a bulletin (No. S-54) issued by Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13, Michigan.

11. Diamond Wheels. A.I.T. Diamond Tool Co., 646 W. Lake St., Chicago 6, Ill., has published a catalog describing the "Chip-A-Lap" Diamond Wheel which is available in "Al-Aloid" or resin bond.

12. Compression-Type Shock Mounts which are designed to prevent damage to fragile shipments are described in a leaflet released by The Barry Corp., 883 Pleasant St., Watertown, Mass.

13. Hand Lever Punch and Shear. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y., has issued a bulletin (No. 79-B) describing and illustrating its No. 5-24 Deep Throat Hand Lever Punch and Shear.

14. Toolholders which are available with either negative or neutral rake and in styles for triangular, square and round "throw-away" blanks are described and illustrated in a catalog (No. VR-436) released by Vascoloy-Ramet Corp., Waukegan, Illinois.

USE CARD FOR FREE LITERATURE

15. Fully Adjustable Indicating Snap Gages designed for all-purpose use at the machine or for bench inspection are described in a catalog (No. 54 E) released by Reliant Industries, 4947 Firestone Blvd., South Gate, California.

16. Metalcutting Shears which are designed for fast and easy operation are described in a bulletin (No. CC) published by Beverly Shear Mfg. Co., 3000 W. 111th St., Chicago 43, Ill. Specifications are included.

17. Honing Equipment. Sunnen Products Co., 7910 Manchester, St. Louis 17, Mo., has issued a booklet listing 35 benefits that can be realized from honing, showing the working principle of Sunnen honing and telling how it differs from other metalworking methods.

18. Valves for machine tool hydraulic mechanisms, oil-burning equipment, rams, presses, Diesel engines, and so on, are described in a condensed catalog published by The Fulflo Specialties Co., Inc., Blanchester, Ohio.

19. "Hints on Heat Treating Tool Steel" is the title of an article, to help small machine, tool and die shops who do not have metallurgists but want to do their own heat treating, released by K. H. Huppert Co., 6841 Cottage Grove Ave., Chicago 37, Illinois.

20. Tools and Holders. R. B. Tool Co., Inc., 783 N. Broadway, White Plains, N. Y., has issued literature describing its internal threading tools, tool sets for jig borers, toolholders, boring bars and holders and cutting-off tools.

21. Hard Chrome Plating. Wagner Brothers, Inc., 400 Midland Ave., Detroit 3, Mich., has issued a folder (No. F 30-54) describing a package unit for hard chrome plating of production tools and parts.

22. Materials Handling Equipment, including Shoplifters, Worklifters, elevating tables, trucks, barrel stands and accessory items, is described in a bulletin (No. 54) published by Economy Engineering Co., 4507 Lake St., Chicago 24, Illinois.

23. Chucks, Holders, Mandrels, Air Cylinders, Speed Indexers, Cutting Bars and Special Holding Fixtures are described in a catalog (No. K) released by Erickson Tool Co., 2303W Hamilton Ave., Cleveland 14, Ohio.

24. Micrometers. George Scherr Co. 200-MM Lafayette St., New York 12, N. Y., has issued a pamphlet on its micrometers which are furnished in two styles —the Series 900 with dull chrome finish throughout and the Series 800 with black enameled steel frame.

25. Releasing, Adjustable Torque Drivers for Taps are described in a bulletin (No. 20-50) published by Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8, Ill. Specifications and line drawings are included.

26. Automatic Positioning Table, available as a separate unit for use on radial drilling machines is described in a bulletin issued by The Fosdick Machine Tool Co., Cincinnati 23, Ohio. Specifications and other data are included.

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27. Spring Pin. Standard Pressed Steel Co., Box No. 556, Jenkintown 22, Pa., has released a folder illustrating the versatility of the Sel-lok Spring Pin in a wide variety of applications. Complete specifications and dimensional drawings are included in the folder.

28. Drill Press Tapping Equipment with "Tru-Grip" Tap Holders is described in a bulletin (No. 101) released by Procunier Safety Chuck Co., 12 S. Clinton St., Chicago 6, Illinois. Specifications and cross-sectional drawings are included.

29. "We're up to Our Neck in Good Shopkeeping" is the title of a booklet printed by F. E. Anderson Oil Co., Inc., Box 216-J, Portland, Conn., to encourage shop sanitation through the care of machine tool coolants.

30. Grinding Attachment. Grinders & Fixtures Inc., 8327 Clinton Rd., Cleveland 9, Ohio, has issued a catalog describing the "Sharp-Grind" Attachment for converting a surface grinder into a tool grinder.

31. Mill Heads for vertical, angular and compound angle work on horizontal mills are fully described in a bulletin published by Rusnok Tool Works, 4840 W. North Ave., Chicago 39, Ill. Dimensional drawings are included.

32. Sub-Plate Mounted, Solenoid Operated, Hydraulic Valves, suitable for full 3,000 p.s.i. and meeting all J.I.C. requirements are described in a catalog (No. 260) released by Rivett Lathe & Grinder, Inc., Dept. MM R5, Brighton 35, Boston, Massachusetts.

33. Power Hack Saws. Sales Service Machine Tool Co., 2355 University Ave., St. Paul 4, Minn., has released a folder, a combination specification and price sheet, showing 10 models of the complete Keller Power Hack Saw line.

34. Ejection, Guide, Gage or Stop Pins and Finger Stops are described in a bulletin released by Twentieth Century Mfg. Co., Route 176 and Bradley Rd., Box 429M, Libertyville, Illinois.

35. "Use the Right Blade for Every Job," a wall chart which tabulates metal cutting data on hand, power and band saws to simplify blade selection, has been issued by Victor Saw Works, Inc., Middletown, New York.

36. "Weld Grinding and Blending with 3M Abrasives," a booklet describing the use of coated abrasive discs and belts for weld removal, is available from Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minnesota.

37. Press Modernization and Conversion. E. W. Bliss Co., Canton, Ohio, has issued a brochure (No. 46) containing recommendations for the modernization and conversion of straight-side and gap-frame double-crank presses. Eighteen examples of 42 conversion assemblies are illustrated.

38. Dual-Purpose Marking and Cut-Off Tool, designated as the Model 700, which operates from a single station of most automatic screw machines is described in a bulletin (No. 700-54) released by New Method Steel Stamps, Inc., 147 Joseph Campau, Detroit 7, Michigan.

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BUSINESS REPLY CARD

First Class Permit No. 487, Sec. 34.9, P. L. & R., Cincinnati, Ohio

MODERN MACHINE SHOP
431 MAIN STREET
CINCINNATI 2,
OHIO

MAIL THIS CARD TODAY
for free literature
. . . no postage to pay!

39. Turret Lathe. Cosa Corp., 405 Lexington Ave., New York 17, N. Y., has released a bulletin describing the Pittler Turret Lathe, Model "Pirofa" 45.

40. Solid Adjustable Taps which cover a tapping range of from 1 1/16 to 9 in. are described in a revised bulletin (No. G-92-2). published by Landis Machine Co., Waynesboro, Pennsylvania.

41. Vapor Collectors. Aget-Detroit Co., 207 Main St., Ann Arbor, Mich., has issued literature showing how mist from a group of centerless grinders is controlled by individual unit type Dustkop Vapor Collectors.

42. Surface Plates. The Herman Stone Co., 324 Harries Bldg., Dayton 2, Ohio, has released a folder describing and illustrating its complete line of granite surface plates.

43. Fine-Pitched Heavy-Duty Inserted Carbide Blade End Mills are described and illustrated in a bulletin issued by Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, Michigan.

44. Diamond Wheels. United States Diamond Wheel Co., 837 Illinois Ave., Aurora, Ill., has published a catalog (No. 850). describing its line of diamond wheels.

45. Air Gages. The Taft-Peirce Mfg. Co., Woonsocket, R. I., has released a catalog (No. 613) covering CompAIRator Air Gages.

46. Try-Out Presses, which are available in nine standard models from 25 to 300-ton capacities with or without die cushions, are described in a bulletin (No. 330) published by Dake Engine Co., 612 Monroe St., Grand Haven, Michigan.

47. Slide Rule Gage Selector. The selection of proper pitch diameters for all American or Unified thread plug or ring gages is made easy by a slide rule gage selector released by The Sheffield Corp., Dayton 1, Ohio.

48. "New Life for Worn-Out or Damaged Presses" is the title of a bulletin (No. R-49) which has been re-issued by Verson Allsteel Press Co., 9310 S. Kenwood Ave., Chicago 19, Illinois.

49. Automatic Recording Precision Measuring Instrument, designated as the "Probograph," which records dimensional measurements in graph form is described in a catalog released by The Warner & Swasey Research Corp., 34 W. 33rd St., New York 1, New York.

50. "Cold Rolled Specialty Steels," the title of a booklet (No. TM9) released by Crucible Steel Company of America, Box 88, Pittsburgh 30, Pa., contains up-to-date data on cold rolled specialties.

51. High Speed and Carbon Twist Drills are described in a catalog issued by Precision Twist Drill & Machine Co., 5023 W. Armitage Ave., Chicago 37, Illinois.

52. Standard Single Point Carbide Tools, as well as carbide tips and blanks, are covered in a bulletin published by DoAll Philadelphia Co., 2053-59 E. Glenwood Ave., Philadelphia 24, Pa.

53. Electronic Gaging Equipment. Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio, has issued a bulletin (No. 541) on the measuring system used in Cleveland electronic dimensional gaging equipment.

54. Lathes, Drill Presses, Shapers and Pedestal Grinders are described in a general catalog (No. 5406) published by South Bend Lathe Works, South Bend 22, Indiana.

55. Micrometers. De Witt Equipment Corp., 136 Lafayette St., New York 13, N. Y., has released a bulletin describing precision micrometers, screw pitch micrometers, adjustable micrometers and accessories. Specifications are included.

56. Hydraulic Surface Grinder. The Thompson Grinder Co., Springfield, Ohio, has issued a catalog (No. C53) describing the Type C Hydraulic Surface Grinder.

57. Portable Electric Grinder-Millers, Power Quills, Machine Tool Mounts and Accessories are described in a catalog (No. FGH-1). published by Precise Products Corp., 1345 Clark St., Racine, Wis.

58. Turret Drilling Machine. Burg Tool Mfg. Co., Dept. MM, 3743 Durango Ave., Los Angeles 34, Calif., has issued a bulletin describing the Burgmaster Model 2BH and Model 3BH Turret Drilling Machines. Specifications are included.

59. Milling Machine. Sundstrand Machine Tool Co., 2539 Eleventh St., Rockford, Ill., has released a circular describing the Model 66 "Rigidmil" Milling Machine which features a 100 to 1 ratio feed range.

60. "Quick Facts to Aid in Selecting Die-Less Duplicating Equipment" is the title of a booklet published by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn. The booklet covers the line of Di-Acro Metalworking Machines.

USE CARD FOR FREE LITERATURE

metalworking news in brief

Lindberg Engineering Co., Chicago, Ill., has announced the appointment of **E. B. Jones** as chief engineer in charge of estimating and engineering in the newly-formed Field-erected Equipment Division. **C. P. Masure** has been appointed purchasing agent for the new division. Both Mr. Jones and Mr. Masure were formerly associated with Continental Industrial Engineers Incorporated.

— o —

A new district sales office for the Tubular Products Division of The Babcock & Wilcox Company has opened in Cincinnati, Ohio, at 2330 Victory Parkway. **Henry W. Doctor** of the Beaver Falls district sales office has been named district sales manager and will be in charge of the operations in Cincinnati. **Russell French** of the Philadelphia sales office is also being transferred to Cincinnati. The territory to be served by the new office will include southern Ohio, southern Indiana and the states of Kentucky, Tennessee, Alabama, Georgia, South Carolina, North Carolina and Florida.

— o —

The election of **Edward R. Newcomb** to vice president of export sales of the International Division has been announced by Minnesota Mining & Mfg. Co., St. Paul, Minn. The company has also announced that **E. Harlan Church,** assistant treasurer of the parent company, was elected treasurer of the division, and **Eugene F. Kindler** was elected assistant treasurer.

Grieve-Hendry Company, Inc., manufacturer of laboratory and industrial ovens, has moved its factory to larger quarters located at 1401-17 W. Carroll Ave., Chicago 7, Illinois.

— o —

Arthur W. Johnson, former assistant chief engineer of Arms Franklin Corporation, has joined the engineering staff of E. W. Bliss Co., Rolling Mill Division, Salem, Ohio. Mr. Johnson participated in the development of the Weld-A-Matic Splicer which was recently acquired by Bliss.

— o —

Ernest A. Herrcke, manager of the Chicago office of the National Automatic Tool Company, died recently at the age of 65 years. Mr. Herrcke became associated with NATCO in 1924 as an assistant engineer and assumed the role of manager of the Chicago office in 1937, a position he held until his death.

— o —

Walter W. Hambrecht, formerly assistant to the supervisor of Form and Finish, has been made manager of the Finishing Division of Standard Pressed Steel Co., Jenkintown, Pa. In his new post, Mr. Hambrecht has charge of all hand machines, of drilling and grinding and of the rolled thread and plating departments. The company has also announced the appointment of **Fred C. Gartling** as assistant supervisor of industrial relations. Mr. Gartling was formerly the company's wage and salary administrator.

Metalworking News in Brief

George R. Foster has been appointed manager of the stainless steel division, general sales department, of United States Steel Supply Division, U. S. Steel Corp., Chicago, Ill. Mr. Foster joined United States Steel in 1943.

—o—

Edward A. Farwig and **Otto Haisch** have been named to new positions by Buhr Machine Tool Co., Ann Arbor, Mich. Mr. Farwig, formerly assistant to the sales manager, was appointed chief engineer, and Mr. Haisch, who has been engaged in sales engineering work for the past six years, took over Mr. Farwig's duties as assistant to the sales manager.

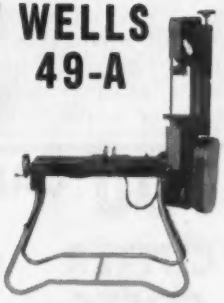
—o—

Firth Sterling, Inc., Pittsburgh, Pa., has appointed four new distributors for its steel and carbide products. **Denman & Davis,** 2038 83rd St., North Burgen, N. J., will be the exclusive distributor of tool and die steels in that area; **O'Neal Steel Co.,** 745 N. 41st St., Birmingham, Ala., will distribute tool and die steels and high speed steels in the states of Georgia, Alabama, Mississippi, Arkansas, northern Florida, northern Louisiana and eastern Tennessee; and **The Mau-Sherwood Supply Co.,** 800 Lime Rd., Cleveland 13, Ohio, and **Standard-Shannon Supply Co.,** 13 S. Letitia St., Philadelphia 6, Pa., will both distribute Firthite tools and tips, high speed bits, drill rod and Invaro flat stock in the Cleveland and Philadelphia areas respectively.

Announcing . . .

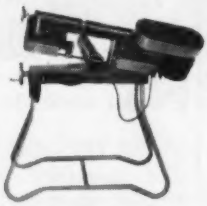
2 BANDSAWS *in* 1

The Versatile NEW WELLS 49-A



USE IT AS A VERTICAL BANDSAW

In this position the New Wells 49-A is a Utility Upright Bandsaw for vertical cutting of angles, slots, notches, bevels and contour work. Ample power, efficient (3 speed) V-Belt Drive and sturdy construction assure smooth, even cutting.



USE IT FOR HORIZONTAL CUT-OFF

In this position your dual purpose New Wells 49-A becomes an Efficient, Economical Horizontal Cut-Off Saw that will handle "man sized" cut-off jobs in large or small shops. It's an ideal tool for "job-site" work and handy for maintenance or utility work.

Write today for complete information.

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Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
808 TYLER ST. - THREE RIVERS, MICH.

Metalworking News in Brief

Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., has announced the appointment of **Stanley W. Lovejoy** to the position of manager of Cutting Tool Research. In his new position, Mr. Lovejoy's duties will include basic research, development and testing of products manufactured in the company's Cutting Tool Division.

—o—

Snyder Tool & Engineering Co., Detroit, Mich., has announced the appointment of **William C. Goeckel** to the post of sales manager.

—o—

Adamas Carbide Corp., Kenilworth, N. J., manufacturer of standard carbide tools, tool tips, dies and wear parts, has announced the appointment of **Production Tooling Service,** 411 N. 23rd St., Birmingham, Ala., as its sales representative for the states of Alabama and Tennessee.

YOU CAN SAVE CUTTER COSTS

. . . an automotive parts supplier recently reported to us that Quality Keyseat Cutters reduced costs by more than 25%.

You, too, can get lower costs with Quality Keyseat Cutters. Investigate now how our 30 years of specialization can benefit you. Quick delivery on specials.

Write for circular and price list.
Jobber and Mfg. Agents inquiries also invited.

QUALITY TOOL WORKS

792 S. MARKET STREET, WAUKEGAN, ILLINOIS

Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati, Ohio, has announced that its Los Angeles, California, district office has moved from 2711 E. Eleventh Street to 3018 E. Olympic Boulevard in Los Angeles. **Lafe Resler** is manager of the Los Angeles office.

—o—

Producto Corp., Detroit, Mich., has announced the appointment of **Denzil Hawkins** as manager of the company's Dayton warehouse located at 3632 Delphos Ave., Dayton, Ohio. Mr. Hawkins recently joined Producto as sales representative in the Indiana and southwestern Ohio territories.

—o—

William C. Woodward has been appointed manager of forging sales for Aluminum Company of America, Pittsburgh, Pa. In his new position, Mr. Woodward will coordinate sales of aluminum and magnesium forgings through Alcoa sales offices all over the country, with headquarters at Alcoa's Cleveland Works.

—o—

Austin Ford Logan, Inc., Buffalo, N. Y., has been named an authorized distributor for Carboloy Department of General Electric Co., Detroit, Mich. The organization will carry the department's entire line of standard cemented carbide tools and blanks, carbide-tipped masonry drills and diamond wheel dressers.

—o—

At the annual meeting of the board of directors, **Thomas H. Brumagin,** chief engineer, has been elected to the board of directors of Ajax Flexible Coupling Co., Inc., Westfield, N. Y. Mr. Brumagin has been associated with Ajax since 1946. The following directors were re-elected: **William T. Welch, Wayne Belden, Harley E. Northrop, Charles W. Belden, Robert G. Cady, J. Guy Griffith** and **Arthur E. Jones.**

Metalworking News in Brief

Maurey Manufacturing Corporation has added two field representatives to its midwestern staff. **Ed Ostrander,** formerly associated with Caterpillar Tractor, has been appointed to cover the central and southern Illinois and Iowa territory. **Robert J. Carr,** formerly connected with Victor Gasket Company, has taken charge of sales in the Chicago, Indiana and western Michigan territory.

—o—

At a recent meeting of the board of directors of Abrasive & Metal Products Company, **Paul B. Brown** was made a director of the corporation. In addition, Mr. Brown was appointed to the positions of president and general manager of the Peninsular Grinding Wheel Division and to the office of president of the Peninsular Grinding Wheel Sales Corporation, a wholly-owned subsidiary.

John P. Moorhouse has been assigned the duties of director of purchases under his present title of purchasing agent at Standard Pressed Steel Co., Jenkintown, Pa. Mr. Moorhouse succeeds **Edwin Y. Bready** who was named division manager of the Hallowell Pressed Steel Division of SPS earlier this year.

—o—

Chambersburg Engineering Co., Chambersburg, Pa., has announced several management changes. **Eugene C. Clarke, Jr.,** vice president, has been advanced to general manager of the company and assumes the duties of general administration. Other changes in management include **Kenneth W. Palmer,** who is advanced to vice president and continues as treasurer; **C. Douglas Galloway III,** who becomes secretary and is advanced to works manager; and **George H. Martin,** who becomes foundry superintendent.

THE BETTER BUY

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SHOP GRINDERS

With ball-bearings that never require re-lubrication.

fully guaranteed

AT RIGHT: Baldor Grinder No. 600 series. 1/3 hp., ball-bearing, dynamically balanced motor. 1 phase, 60 cy., 3450 rpm. Two first-grade, individually balanced 6" wheels—1 coarse, 1 fine. Motor stands repeated overloads and WILL NOT BURN OUT. Wide clearance between wheels and motor frame for fast, precision grinding.
It's the Better Buy at..... $49.00

BALDOR ELECTRIC COMPANY
4380 Duncan Ave., ST. LOUIS 10, MO.

Metalworking News in Brief

The appointment of **George J. Wachholz** as controller has been announced by Minnesota Mining & Mfg. Co., St. Paul, Minn. Associated with the company since 1936, Mr. Wachholz will now be responsible for the preparation of budgets and supervision of operating accounting controls and procedures for 3M divisions and domestic subsidiaries. The company has also announced the promotion of **William H. Armstrong** to sales supervisor of "Honite" brand products. Previously a salesman in Philadelphia and New York, Mr. Armstrong will have his headquarters in St. Paul, Minnesota.

— o —

Micromatic Hone Corp., Detroit, Mich., has announced the appointment of **Vas Peickii** as factory manager of its Los Angeles plant. Mr. Peickii is a former partner of M. E. Engineering Co., Los Angeles, whose equipment and goodwill was purchased by Micromatic.

Carboloy Department of General Electric Co., Detroit, Mich., has announced that **Edgar W. Engle,** manager of product and process development engineering, has been named manager of cemented carbide products engineering. The firm has also announced that **Fred H. Schonberger,** Philadelphia sales representative since 1937, has retired. Mr. Schonberger was active in the development and promotion of field training programs.

— o —

Geoffrey M. Rollason, general manager of the Die Castings Division, Aluminum Company of America, has retired after 35 years with the company. Long a leader in the light metal fabricating industries, Mr. Rollason is currently serving as president of the American Die Casting Institute.

— o —

E. V. Nielsen has been appointed as general sales manager of the newly formed sales organization, E. V. Nielsen, Inc., 128 Broad St., Stamford, Connecticut.

14,000-Ton Extrusion Press

DESCRIBED as the world's largest press for the extrusion of metal, the 14,000-ton press shown herewith has begun squeezing out giant aircraft parts at Aluminum Company of America's Lafayette (Ind.) Works. Auxiliary equipment for the press includes a massive 180-ft. long stretcher which, in conjunction with the press, will produce aircraft structural parts for such giant planes as the Boeing B-52 jet bomber.

Metalworking News in Brief

Buhr Machine Tool Co., Ann Arbor, Mich., has announced the appointment of four new manufacturer's agents. **Ellfeldt Machinery & Supply Co.,** Kansas City, Mo., will cover Kansas, Oklahoma and western Missouri; **Interstate Machinery & Supply Co.,** Omaha, Nebr., will handle all of Nebraska and western Iowa; **Giebel Inc.,** New York, N. Y., will cover eastern New York State, Connecticut and northern New Jersey; and **Tool Engineering Service,** Birmingham, Ala., will handle Florida, Georgia, Tennessee, Alabama and northern Mississippi.

—o—

Robert C. Lohbauer has been appointed to the sales engineering staff of Snyder Tool & Engineering Co., Detroit, Mich. Mr. Lohbauer will make his headquarters in Detroit and will operate on an assignment basis.

Rollway Bearing Co., subsidiary of Lipe-Rollway Corp., Syracuse, N. Y., has announced the appointment of **Howard D. Brown** as an engineering representative of Rollway's Detroit office. Mr. Brown will cover the Michigan and Indiana territory.

—o—

The appointment of **R. A. Carlson** as vice president and manager of engineering has been announced by the Rockford Clutch Division of Borg-Warner Corp., Rockford, Ill. Mr. Carlson previously served as chief engineer and sales engineer for Rockford Clutch. The company has also announced that **E. R. Williams,** assistant sales manager, has been promoted to sales manager and will be succeeded by **F. C. Fager. E. C. Shields,** vice president and general sales manager of Rockford Clutch, has announced his retirement. Mr. Shields has served in his present capacity with the division for 25 years.

NOT JUST CARBIDE TIPPED

R. B. Carbide Tools now come with HEADS of SOLID CARBIDE. Same price, but longer tool life!

Immediate Delivery from Stock:
Boring Tools, Facing Tools, Threading Tools, for min. boring diams. from 1/8" up.
Write Dept. 783 for FREE Catalog.

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CANADIAN M. S. E.
171 Kipling Avenue South
Toronto 18, Ontario

R.B.TOOL Co., Inc.
785 North Broadway
White Plains N.Y.

Metalworking News in Brief

Elroy L. Sivertsen has been appointed salesman in the Los Angeles office of Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati, Ohio. Mr. Sivertsen will handle Cimcool, a chemical cutting fluid, and Cincinnati grinding wheels in the area from western Los Angeles toward Culver City.

— o —

Garber Engineering Associates, 604 Fort Wayne Ave., Indianapolis 4, Ind., has been named sales representative by Lodding Inc., Worcester, Mass. Garber will carry a full stock of Lodding jig and fixture components.

— o —

Vanadium-Alloys Steel Co., Latrobe, Pa., has announced the election of **Lawrence E. Moore** to the position of secretary-treasurer of its Colonial Steel Division.

NEW "BENDIT 15" METAL FORMING MACHINE

• A new approach to BENDING — FOLDING — SHAPING — DUPLICATING for SHEET, STRIP, TUBING and WIRE.

• FAST

• ACCURATE

• EASY TO OPERATE

ADDITIONAL FEATURES:

Bends radii from 1/32" to 5/8".

Forms without damage.

Capacity 18" width.

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Made by manufacturers of "BEND IT JR." — "CURVETTE" and "CURVIT"

Lund Mfg. Co., Biddeford, Maine.

Western Distributor:

Purcell Products Co., Wilmington, Calif.

Industrial Tool & Supply Co., San Jose, Calif., has been named an authorized distributor for Carboloy Department of General Electric Co., Detroit, Mich. The organization will carry the department's entire line of standard cemented carbide tools and blanks, carbide-tipped masonry drills and diamond wheel dressers.

— o —

The appointment of **John T. Everett & Co.,** Memphis, Tenn., as southern and southwestern sales representative has been announced by Safety Socket Screw Co., Chicago, Ill. The Everett organization, headed by **W. N. Wilkerson,** has offices and warehouses in Atlanta, Georgia, and Houston, Texas, in addition to its Memphis headquarters.

— o —

The AP Parts Corp., Toledo, Ohio, has announced the appointment of **The Chicago Solid Lubricant Co.,** 1545 S. State St., Chicago, Ill., as exclusive distributor in the Chicago area for the complete line of colloidal synthetic graphite and molybdenum disulphide lubricants for industrial uses.

— o —

Ampco Metal, Inc., Milwaukee, Wis., has announced the appointment of the **William M. Orr Co., Inc.,** N. Braddock Ave. at Thomas, Pittsburgh 8, Pa., as a distributor of stock Ampco raw materials. The company will handle Ampco Metal Grade 18 extruded rod, Grade 18 centrifugally cast bars, Grade 24 stock dies and Grade 8 sheet and plate.

— o —

George F. Fry, Jr., president, and **Roy Rosebrook,** chief engineer, of True Trace Sales Corp., El Monte, Calif., are now making an extended swing around the United States to set up distributors for the company's hydraulic tracing valves. According to **William J. Betz,** treasurer of the firm, **Leo M. Cross** has been appointed regional sales manager.

Ernest E. George, manager of design and application engineering, Carboloy Department of General Electric Co., Detroit, Mich., has been named manager of magnetic products engineering. Mr. George has been associated with the department since 1933.

— o —

Peter A. Frasse & Co., Inc., New York, N. Y., has been appointed as a distributor of aluminum for the Reynolds Metals Company. Frasse, a steel distributor since 1816, will carry aluminum in rods, bars, wire, sheets, plates, tubing and extruded shapes.

— o —

A. H. d'Arcambal, president and general manager of Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., has announced the appointment of **Jacob J. Jaeger** to the newly-created post of chief engineer of the Machinery Engineering Department of Pratt & Whitney. Mr. Jaeger became associated with P&W in 1940 as a research engineer and was made assistant manager of machinery engineering in 1951.

— o —

Morse Chain Co., Detroit, Mich., has announced the formation of a new application engineering division, headed by **Ralph E. Cherry. Earl E. Wesselhoff** has been named assistant chief engineer in charge of development.

— o —

National Pneumatic Co., Inc., Boston, Mass., has announced the appointment of **Charles W. Ledig** as sales manager of the company's Industrial Actuators and Controls Division. Mr. Ledig has been associated with National Pneumatic for 13 years.

— o —

American Machine & Foundry Company has established two new engineering departments, Advanced Development Engineering and Buffalo Product Engineering, to replace the former engineering department at the company's Buffalo plant. **Robert L. Holloway,** formerly chief engineer of the Buffalo plant, has been appointed chief engineer of the Advanced Engineering Department. Chief engineer of the Buffalo Product Engineering Department is **Herbert E. Oles,** formerly section manager of product engineering of the former Buffalo plant's engineering department.

— o —

The honorary degree of Doctor of Engineering was conferred on **Alfred Iddles,** president of The Babcock & Wilcox Co., New York, N. Y., at commencement exercises held recently at Michigan State College, East Lansing, Michigan.

— o —

Edwin T. Jackman and **George R. Brotherton** have joined the sales staff of Vanadium-Alloys Steel Co., Latrobe, Pa. Both men will serve as sales representatives.

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

Write for Folder

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3525 Cordiff Ave. • Cincinnati, Ohio

Book reviews

Refresher Notes in Machine Design. By John D. Constance. Published by Pelex Publishers, Inc., 95 Liberty St., New York 6, N. Y. Heavy paper covers, plastic binding. Price, $2.50.

This book reviews basic design formulas applying to statics, kinematics, stress and strain, springs, cams and machinery. Produced in the form of hand-lettered notes, the bulk of the book is devoted to typical problems, including those from past professional license examinations. Tables of mechanical, electrical and heat equivalents, together with engineering constants, comprise the appendix.

Job Evaluation Methods. Second Edition. By Charles Walter Lytle. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 528 pages. Illustrated. Cloth binding, board covers. Price, $7.50.

This comprehensive and systematic presentation of job evaluation offers a wealth of up-to-date procedures and applications proved successful in almost every type and size of organization. The book is a dependable reference to all currently accepted methods and techniques for determining a fair day's pay for a fair day's work. It shows how to build up a job evaluation plan from necessary elements; how to meet the requirements of an individual company, instead of trying to make a ready-made plan fit particular conditions. Drawing on wide consulting experience and on extensive case material, the author makes abundantly clear every aspect of the important, job-rating area of industrial relations; how to set up a plan and the way to operate it; what the benefits are for management and workers.

Job evaluation is treated analytically according to the steps that comprise the evaluation procedure. A separate chapter is devoted to each step so that the various devices and techniques for taking that step are carefully investigated and compared. Through this logical and readily understood presentation, the reader acquires a better grasp of the essentials that enable him to handle with authority the details of devising, setting up and operating a job evaluation plan.

The analytic approach and detailed presentation make this book equally adaptable to the needs of personnel directors, industrial engineers, management and union executives and to the requirements of senior and graduate courses in colleges of engineering and commerce.

Alloy Steels Pay Off. Published by Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y. 207 pages. Heavy paper covers.

This book attempts to show some of the changes in economic factors that have made alloy steels as a class increasingly more price-worthy and presents some actual case histories where the adoption of alloy steel has saved money for the producer of the finished parts, or the user, or both. The book does not try to show what specific grade of alloy steel should be used for a given part, but indicates the general benefits—which may include greater pay load, lower operating costs, longer life, greater safety and less maintenance—that may result from the replacement of carbon steel with a properly chosen alloy steel.

Basic Engineering Mechanics and Machine Design. By S. S. Aidlin. Published by Pelex Publishers, Inc., 95 Liberty St., New York 6, N. Y. Plastic binding, leatherette covers. Price, $3.00.

This book presents a review of graphic methods of analysis of problems involving forces, torques, accelerations, and so on, and covers principles of mechanical design and the design of mechanical elements of machinery and equipment. It also contains special tables and charts for calculating gear sizes and designing special sections of machinery. Featured in the book are short-cut methods which are used in leading design offices. Moreover, the clear and direct style of the book makes it especially useful for self-study. The book has been found to have a strong appeal for those preparing for the engineer license examination in several states.

Developing Management Ability. By Earl G. Planty and J. Thomas Freeston. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 447 pages. Cloth binding, board covers. Price, $7.00.

Arranged for quick reference, this volume contains the concise, authoritative answers to 600 questions covering the whole range of management development and training. The questions are those most often asked of the authors in the course of their work as executive training specialists and during their appearances before training and management conferences throughout the country. They are stated in their original, businessman's language. The answers vary in length from short, pointed statements to comprehensive, step-by-step explanations of programs, methods and devices. They are written to give quickly accessible guidance for strengthening work performance at all levels. The specific ways to promote growth in present and future executives are spelled out in detail. Use of staff meetings, case studies, job rotation and the newly developed Guided Experience and Incident Process Methods are fully explained. For everyone with management responsibilities, the book presents development techniques applicable to any kind or size of organization. The book's arrangement makes it equally useful to the reader who wants to progress from chapter to chapter and to the busy operating man who wants pinpoint information on a specific problem.

Engineering Analysis. By Dr. W. Ver Planck and B. R. Teare, Jr. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 344 pages. Illustrated. Cloth binding, board covers. Price, $6.00.

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20 years experience in devising and teaching courses in engineering analysis. The subject is developed by example with special stress on the whole thinking process. The authors show what must be done to translate engineering situations into mathematical language and what is necessary after a mathematical result has been obtained. More specifically, the book deals with such matters as defining the problem to be solved, deciding what principle to apply, choosing coordinate systems, checking thoroughly, choosing dimensionless variables and the sketching of curves. These things, which constitute important elements of the professional method, are presented clearly and simply in the effort to develop in the reader the broad patterns of thinking that are so important in the day-to-day practice of his profession. The book treats a number of subjects needed by engineers from the point of view of use and true understanding. The topics include material from dynamics of translation and rotation, electric circuits, heat transfer, solution of linear differential equations with constant coefficients, uses of power series, integration by graphical and numerical methods, hyperbolic functions and the evaluation of indeterminate forms.

— o —

Quality Control. Second Edition. By Norbert L. Enrick. Published by The Industrial Press, 148 Lafayette St., New York 13, N. Y. 181 pages. Charts and tables. Cloth binding, board covers. Price, $4.00.

In this enlarged second edition, some 60 pages of new text, tables

Spun Steel Heads Form World's Largest "Clamshell"

AMONG the largest and heaviest heads ever fabricated, two giant "bowls," together weighing more than 22 tons, were recently completed by the Lukens Steel Company for the Hamilton Standard Division of the United Aircraft Corp., Windsor Locks, Conn. They will be used to form the world's first "Clamshell"—a device for measuring the dynamic "unbalance" of airplane propellers. The two heads for the Clamshell were spun on the largest flanging machine in the world, located in Lukens' Coatesville, Pa., mill. Flanges on both heads were machined to provide the tight fit required to simulate pressures encountered by an airplane at altitudes up to 115,000 feet.

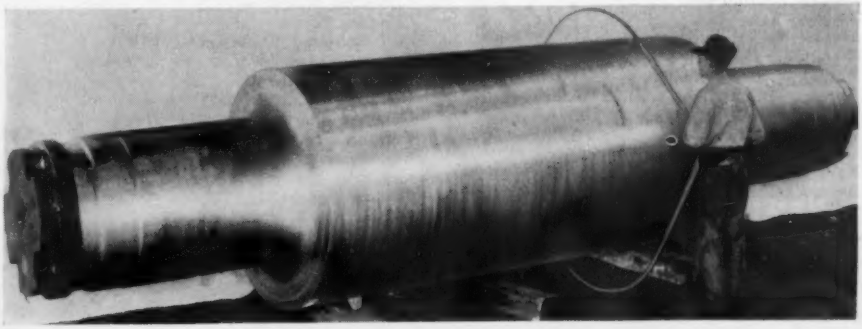
and charts have been added to provide a more complete and useful discussion of quality control in its various aspects. Among the new subjects considered are the coefficient of variation, a yardstick of variability which is often useful, especially in the processing industries; how to test a distribution for normality; how and when to use control charts computed from center lines; the application of multiple control charts to control several individual components of a product at one time; the use of acceptance control charts for accepting or rejecting a product received from an outside supplier; the interpretation of frequency distribution curves; where to use control charts for per cent defective product; and the analysis of variations between machines and departments as an aid in locating sources of product difficulty.

As in the first edition, a simple, direct approach to each subject is used, and both highly technical language and complicated mathematical formulas are avoided. The emphasis is placed on the practical application of quality control and an understanding of the basic methods. As such, this book makes an excellent introductory text for both the student and for the practical man. All the essential techniques of modern quality control are covered, such as sampling plans, control charts, analysis of variations, statistical determination of tolerances, as well as administrative procedures and controls.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Giant Backup Roll

THIS giant backup roll, manufactured, machined and annealed by Continental Foundry & Machine Co., East Chicago, Ind., at one of its plants in Wheeling, W. Va., is said to be the largest in diameter ever made for use in a four-high steel rolling mill. The roll measures 60 in. in diameter and weighs 147,000 lb. as pictured here, after machining. In the rough, the roll weighed close to 185,000 pounds.



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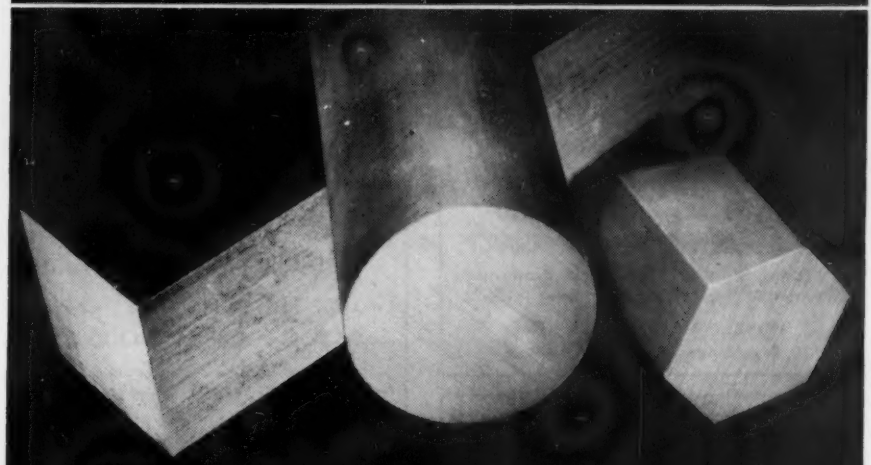

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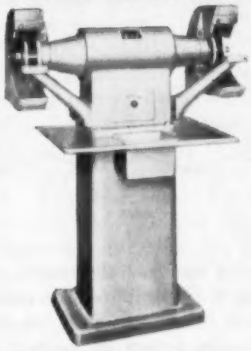

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Die Head Film

The Geometric Tool Company Division of the Greenfield Tap & Die Corp., Greenfield, Mass., has announced the availability of a motion picture entitled "Facts About Die Heads." This 16-mm. sound, color film runs 24 minutes and, as the name implies, features self-opening dies and their operation. In addition, the subjects of solid adjustable die heads and collapsible and solid adjustable taps are covered briefly. The film is primarily educational in character. Typical shots show the proper methods of installation, operation (both hand and automatic), chaser insertion and chaser sharpening. Featured are illustrations of a cut-away self-opening die head and collapsible tap, revealing the collapsing and resetting mechanisms in actual operation.

The film is available for immediate showing by Geometric field men who will supply the projector and screen. Later the film will be available for general distribution to any firm or organization with projection facilities. Bookings under either method are now being arranged. The film is a companion to the Greenfield film, "Facts About Taps and Tapping."

Multipress Films

Three sound films covering the operation of the Denison Multipress have been made available to any interested firm, group or organization by the Denison Engineering Co., 1160 Dublin Rd., Columbus, Ohio. The films show the Multipress in operation in several of the nation's leading plants. "Multipress—and How You Can Use It!" is a 30-minute, 16-mm., black and white sound film that discusses the Multipress and its operating characteristics in detail. "Blanking and Forming" is a 10-minute, 16-mm., black and white sound film showing on-the-job production scenes in detail high speed and multiple stage blanking and forming operations performed by the machine. "Index to Profits" is a 20-minute, 16-mm., black and white sound film describing the use and design features of the Denison Hydraulic Index Table. This film covers in detail a 13-Multipress production line. Animated sequences show complete details of this line which is turning out 15,000 34-piece assemblies per 16-hour day.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

the last word

It's Also a Matter of Attitude

IF you were to ask among your friends and acquaintances how long they usually keep an automobile before trading it in on a new model, we think you will discover as we did recently when we asked that question, that most of them will give you an answer of somewhere close to two years, with many of them saying that they trade their car in for a new model each year. And if you questioned these same people further as to the condition of the car that was turned in, the answer invariably will be that the "old" car was in excellent condition at the time it was traded.

Among your friends and acquaintances, too, we think you have undoubtedly discovered some who don't give a second thought to extensive remodeling of their homes or even to the purchase of new and larger places in which to live, when in reality their present accommodations are more than adequate to meet their needs. It seems that most people, as far as new cars and other so-called necessities are concerned, will go out and purchase the newest models, even to the extent of sacrificing a considerable amount of usability in the old equipment, to say nothing of the loss of dollars that frequently takes place in such a transaction.

It seems a curious paradox to find some of these same people, who might be, for example, operators of metal manufacturing plants, extremely reluctant to part with old and obsolete equipment in their shops. We realize, of course, that it is hardly fair to compare the cost of a new car, or a TV set, or a new refrigerator, or even a new house with the cost of some of the items of production equipment for the shop today. But even when the cost angle is brought into the picture, the man who purchases a new piece of production equipment for his shop stands to profit rather than lose money in the deal. Most new equipment on the market today is far superior, not only in design, construction, tooling and power, but also in production capacity, than was its counterpart of only a few years ago.

We have noticed in the advertisements of consumer product manufacturers that a considerable amount of emphasis is usually placed upon the reasons why a particular product should be purchased. Quite understandably, this technique is designed to overcome whatever reasons the consumer may have for not purchasing the product. In weighing the reasons, for and against, the consumer is likely to find that the reasons in favor of purchase outweigh his objections to purchase. Thus, his attitude toward the product changes and it is more than likely that he will make the purchase.

It is our firm conviction that the advertiser of a product for the metalworking field who is able to call attention to more reasons why a prospect should purchase his product than the prospect is able to find objections why he should not (the consumer advertising technique)

will do more to influence the attitude of the prospect in favor of making the purchase of the product than he could by any other method.

We believe that another logical point could be made here with regard to attitude. If a person wants something badly enough for his comfort and pleasure, he will usually find a way to obtain it, even if it involves making some kind of sacrifice. A person should be willing to adopt the same kind of attitude toward his business. For after all, the shop that is kept modern with the latest tools and equipment is better able to meet competition, and the shop that can meet competition is better able to make a profit, and the shop that can show a profit is the one that is going to stay in business.

What a Hunk of Dough!

SPLASHED across the pages of the newspapers across the country last month was the listing of income paid to officials in some of our leading corporations. At first glance, and even after the second and third glance, the figures looked fantastic. Dr. George S. Benson, Director, National Education Program, points to these income figures as the best illustration of the unsound financial situation in which we are involved today.

A vice president in charge of production for a big manufacturing company is listed as receiving $590,000 for last year's work. We need not discuss this man's real worth to the company, undoubtedly it is great. But we do need to examine the fantastic aspects of this salary.

Just a generation ago a sizable manufacturing company could have been established with $590,000. Had its vice president been a man of unusual capabilities in American industry, capable of expanding production, increasing profits and creating more jobs, he might have received $35,000 a year and earned it. He would have paid a few thousand in taxes. In comparison let's see what happens to today's vice presidents.

If a vice president has only himself and his wife, and his net income is $575,000, the federal government takes in $156,820 of the first $200,000. On the remaining $375,000, the government then levies a 91 per cent tax. That amounts to $341,250. Thus from this one man—working for a salary—the government takes $498,070. This represents about 85 cents in federal income taxes out of every dollar of income. Indirect taxes and other direct taxes hit what's left and so do the state and local taxes, including state income tax, sales tax, and so on.

There is something drastically wrong with a tax program which takes 85 per cent of anybody's salary in income taxes. There is something fundamentally wrong with the tax system when a company must pay out the fantastic sum of $590,000 to give its top production executive a take-home salary in keeping with his worth. The company actually is paying the executive about $7,000 a month, and the federal government $41,500 a month for the privilege of employing him. The situation is ridiculous.

To restore sanity to the financial base of our government, and to safeguard the financial stability of our whole national economy, a broad program of governmental reform is needed. Along with this organic reform must also come a reform in the philosophy of taxation as now practiced.

Fred W Vogel

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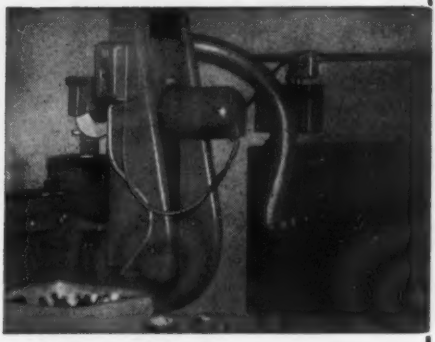

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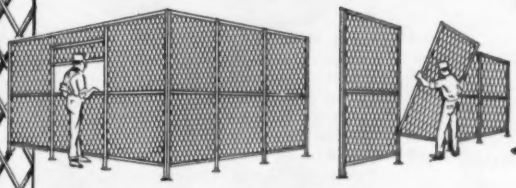

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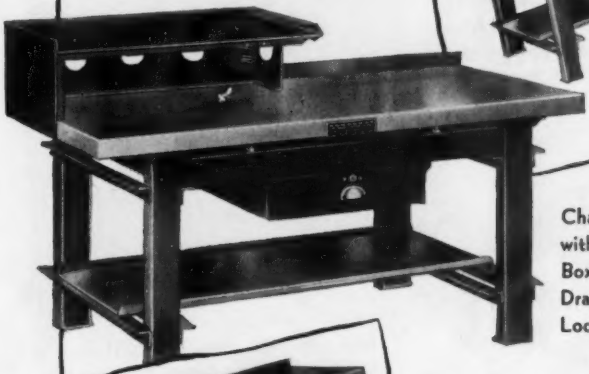

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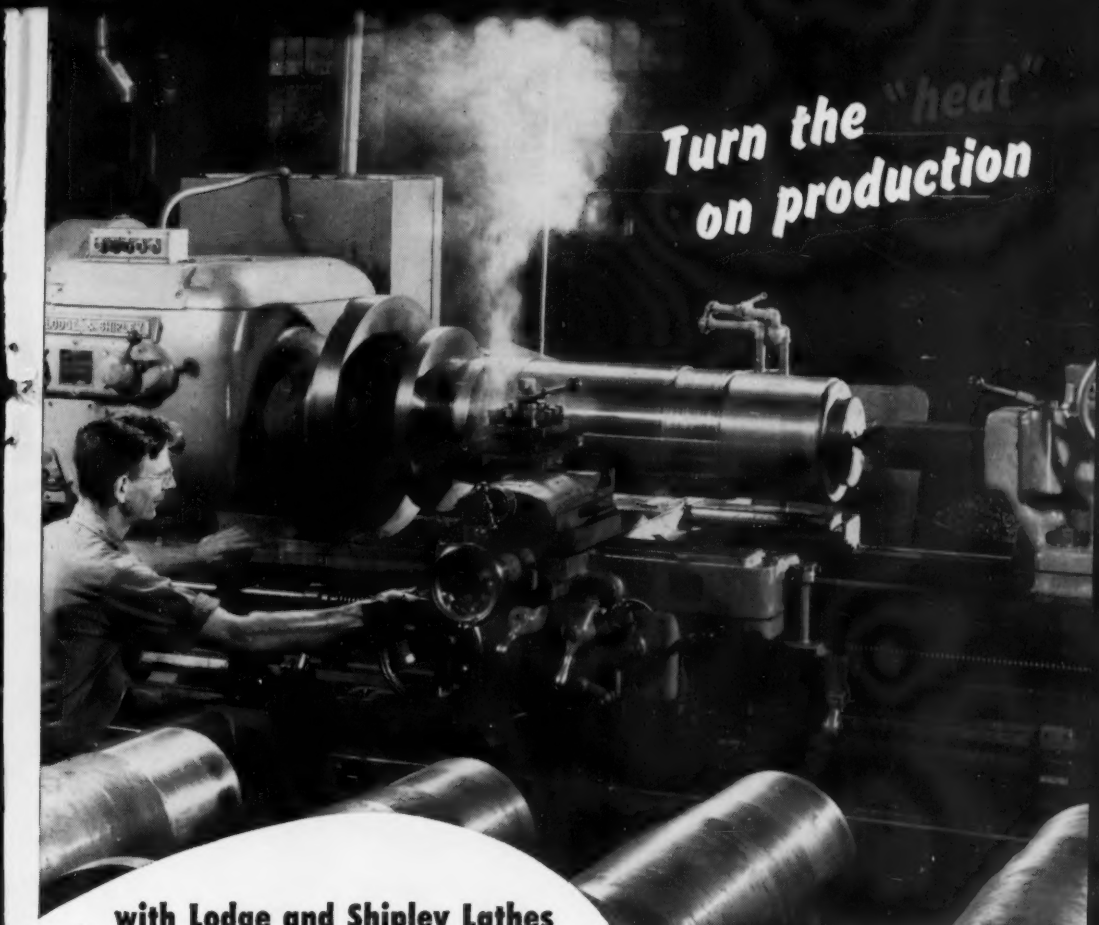

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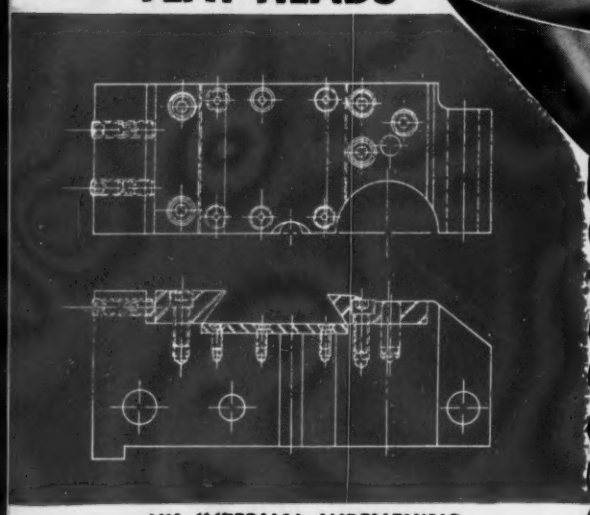

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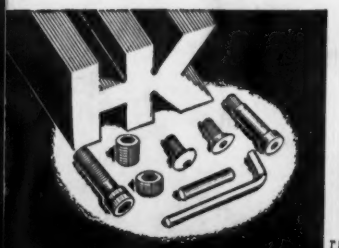

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